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TREES OF PUERTO RICO And the VIRGIN ISLANDS

SECOND VOLUME

Elbert L. Little, Jr.
Roy O. Woodbury
Frank H. Wadsworth

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TREES OF PUERTO RICO
AND THE
VIRGIN ISLANDS
SECOND VOLUME

By

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Front cover: **117. Violeta, violet-tree, *Polygala cowellii* (Britton) Blake. Small to medium-sized tree native only in Puerto Rico. Beautiful masses of violet-colored flowers cover the tree from February to March or April, generally when leafless.**

Back cover: **389. Retama, wattapania, *Sabinea florida* (Vahl) DC. Handsome shrub or small tree native only in the Virgin Islands and Puerto Rico. The entire plant is a mass of bluish purple when in flower, mostly from January to March while leafless. Worthy of wider cultivation as an ornamental.**

Cover of first volume: **151. Maga, *Montezuma speciosissima* Sessé & Moc. Medium-sized tree bearing throughout the year very large red flowers resembling hibiscus (shown two-thirds natural size). Native only in Puerto Rico and widely planted for ornament and shade.**

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INTRODUCTION

The trees of Puerto Rico and the Virgin Islands, both United States and British, are described and illustrated in two volumes, of which this is the second (volume 2). "Common Trees of Puerto Rico and the Virgin Islands" by Little and Wadsworth (*52*, *53*),[2] the first, is cited here as volume 1. The first volume contains on facing pages the descriptions and drawings of 250 common tree species, both native and introduced. This second volume similarly treats 460 additional species and briefly describes 40 others, a total of 500. Thus, the two volumes together contain the text of 750 species and illustrations for 710 of them. The aim is to include all native species attaining tree size, even rarely, also the common and many uncommon trees introduced for various purposes. Information from the Introduction to volume 1 is repeated or revised here. Each volume can be used independently, and the second volume mentions in keys all species of the first.

Puerto Rico and the Virgin Islands (figs. 1, 2) are part of the West Indies or Antilles, an island chain extending from Florida to Venezuela and separating the Caribbean Sea from the Atlantic Ocean. These tropical islands are about 1,000 miles east-southeast of Florida and 1,700 miles southeast of Washington, D. C., and New York City, also only about 500 miles north of Venezuela in South America. All are within 17–19 degrees north latitude and 64–68 degrees west longitude.

As the smallest and easternmost of the four islands known as Greater Antilles, Puerto Rico is rectangular, about 100 by 36 miles in size. Its area is 3,435 square miles, or 2,200,000 acres, about two-thirds that of Connecticut. Nearby are several smaller islands, including Mona, Vieques, and Culebra. Puerto Rico became a part of the United States in 1898, following the Spanish-American war. The island is a Commonwealth or Estado Libre Asociado (literally free associated State) and under a constitution approved in 1952 has self-government except in matters affecting national security.

About 40 miles east of Puerto Rico are the United States Virgin Islands, St. Thomas, St. John, and St. Croix. These three islands, purchased from Denmark in 1917, have a total area of 133 square miles.

Adjacent on the northeast are the British Virgin Islands, a part of the United Kingdom. The four largest, Tortola, Jost Van Dyke, Virgin Gorda, and Anegada, and many smaller isles have a total area of 67 square miles.

It is logical and convenient to treat the trees of all these neighboring islands together, because many species are widely distributed independently of political boundaries. Actually, almost all the native tree species of the Virgin Islands grow wild in some part of Puerto Rico. The Virgin Islands have fewer than 10 native tree species that are absent from Puerto Rico. These few species are mostly rare and local or present also on nearby islands to the southeast.

About 547 species of trees, from the giants of the luxuriant rain forest to the shrubby trees of dry areas and windswept mountain summits, are native to Puerto Rico and the Virgin Islands, both United States and British (fig. 2), and are included in these two volumes. In addition, there are described 203 of the several hundred tree species from other tropical lands around the world that have been introduced into the islands because of showy flowers, handsome foliage, dense shade, valuable timber, delicious fruits, or other values.

With these two volumes, Puerto Rico and the Virgin Islands become one of the first tropical American areas to have a fully illustrated reference on the trees. Identification is aided by the large drawings of the leaves, flowers, and fruit and the descriptive text that emphasizes accurately the distinguishing characteristics in mostly nontechnical terms.

Naturally, there have been many requests for a reference on this subject. Information about most trees of Puerto Rico and the Virgin Islands has not previously been assembled in nontechnical form, and drawings of some have never been published. Nor are technical botanical floras, forestry publications, and miscellaneous scientific references on this subject generally available.

The primary purpose of this 2-volume reference is to answer for the people of these and nearby areas of the West Indies, both residents and tourists, the question: What tree is this? Having answered that, it aims to give the more important and interesting facts about the tree. It should be helpful to university students, teachers of high schools, and instructors in

[2] Italic numbers in parentheses refer to Literature Cited, p. 29.

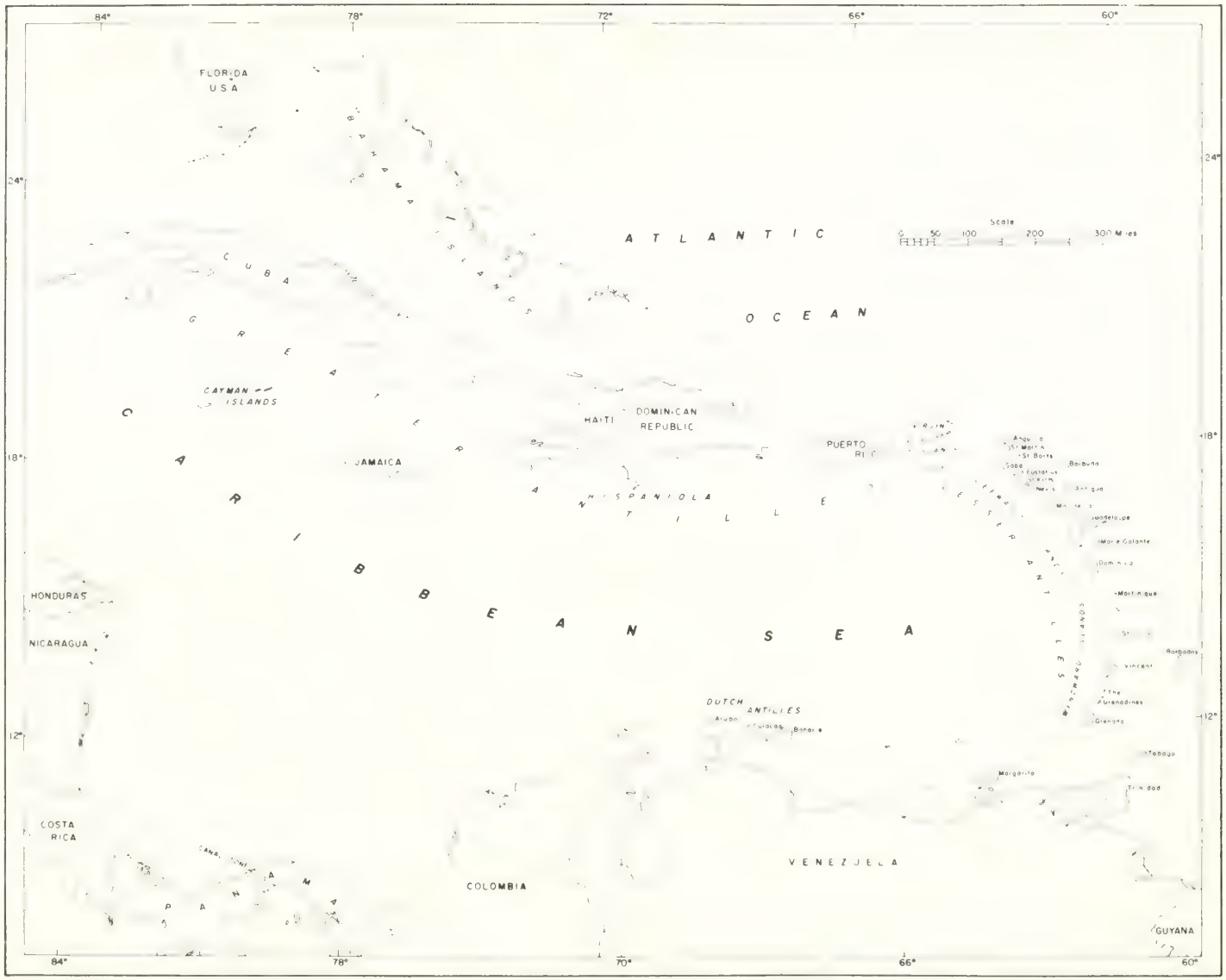

FIGURE 1.—West Indies, showing principal islands and location of Puerto Rico and Virgin Islands with reference to Florida, Central America, and northern South America.

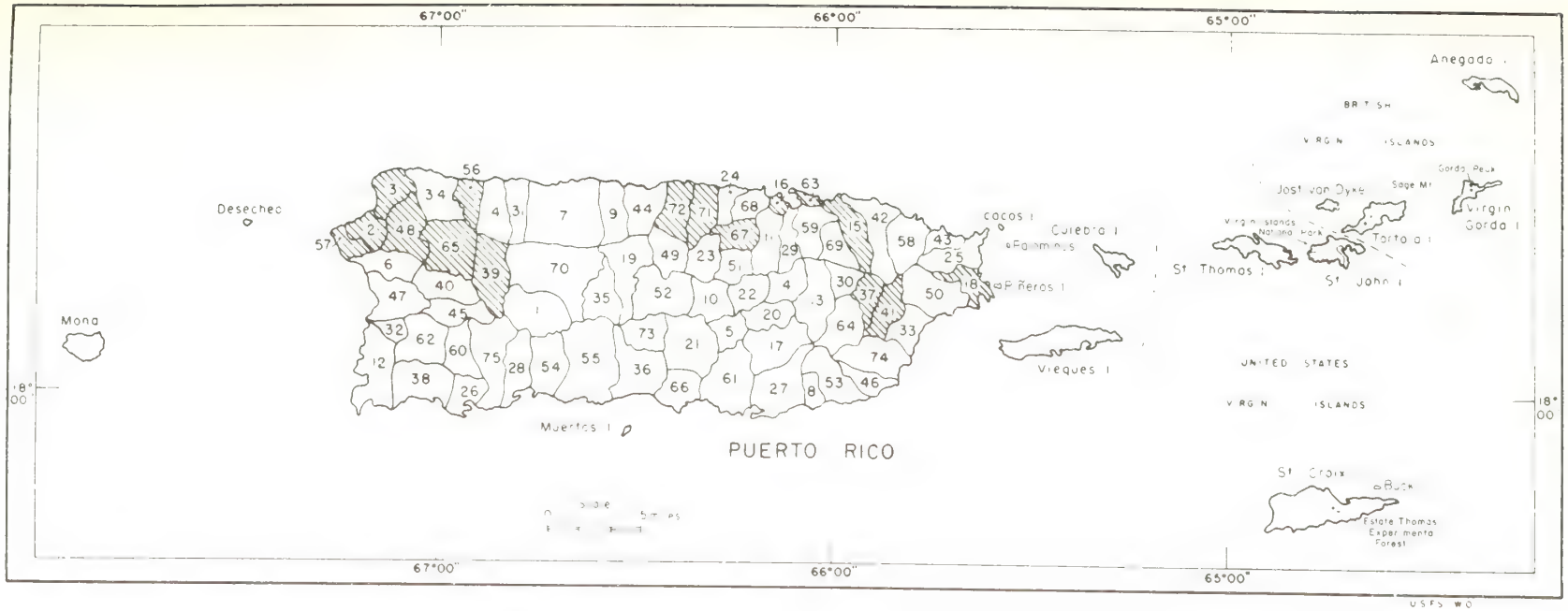

FIGURE 2.—Puerto Rico and the Virgin Islands, showing principal islands (slightly revised from vol. 1, fig. 1). The 4 national parks in the Virgin Islands have been added, also Estate Thomas Experimental Forest in St. Croix. The 75 municipalities of Puerto Rico are designated by number and listed alphabetically below, as aid for finding place names. These numbers were used in 100 species maps in the first volume, compiled from a forest inventory. Sixteen municipalities, shaded and in the list preceded by an asterisk (*), were not covered because of limited forest areas. The islands Culebra and Vieques are municipalities also.

1. Adjuntas
*2. Aguada
*3. Aguadilla
4. Aguas Buenas
5. Aibonito
6. Añasco
7. Arecibo
8. Arroyo
9. Barceloneta
10. Barranquitas
11. Bayamón
12. Cabo Rojo
13. Caguas
14. Camuy
*15. Carolina
*16. Cataño
17. Cayey
18. Ceiba
19. Ciales
20. Cidra
21. Coamo
22. Comerío
23. Corozal
24. Dorado
25. Fajardo
26. Guánica
27. Guayama
28. Guayanilla
29. Guaynabo
30. Gurabo
31. Hatillo
32. Hormigueros
33. Humacao
34. Isabela
35. Jayuya
36. Juana Díaz
37. Juncos
38. Lajas
*39. Lares
40. Las Marías
*41. Las Piedras
42. Loíza
43. Luquillo
44. Manatí
45. Maricao
46. Maunabo
47. Mayagüez
48. Moca
49. Morovis
50. Naguabo
51. Naranjito
52. Orocovis
53. Patillas
54. Peñuelas
55. Ponce
56. Quebradillas
*57. Rincón
58. Río Grande
59. Río Piedras
60. Sabana Grande
61. Salinas
62. San Germán
*63. San Juan
64. San Lorenzo
*65. San Sebastián
66. Santa Isabel
67. Toa Alta
68. Toa Baja
69. Trujillo Alto
70. Utuado
*71. Vega Alta
72. Vega Baja
73. Villalba
74. Yabucoa
75. Yauco

youth programs such as 4-H Clubs, Boy Scouts, and Girl Scouts. It should be a useful reference in extension and technical assistance programs, agricultural research, forestry, and for landowners, landscape architects, and gardeners. Foresters and forestry students in continental United States will find here the descriptions of many common timber trees of tropical America.

For the rapidly increasing number of visitors from continental United States, this reference provides the tree names and answers questions. All interested in nature can use this field guide in identification. Public forests, both natural and managed, are easily accessible by paved highways. The four national parks are attracting more persons each year.

Many of the tree species figured, both native and introduced, are widely distributed over somewhat larger areas in tropical America. Thus, the 2 volumes may be used in the other West Indies and in countries bordering the Caribbean Sea or beyond not having similar publications.

Also, this reference will be helpful within continental United States, notably in southern Florida, where more than one-fourth of these species are native or introduced. The Check List of Native and Naturalized Trees of the United States (*47*) has 75 of these as native, mostly in the Florida Keys or southern Florida mainland, and 34 as naturalized. The others are mostly planted ornamental and shade trees.

Information presented in addition to that required for identification assists the readers to know the tree better and to judge its suitability for timber, shade, ornament, fruit, or other purposes. These notes for many species include: (1) the size the tree attains at maturity; (2) whether evergreen or deciduous (leafless part of year); (3) the normal shape of the crown; (4) the abundance, color, and fragrance of the flowers; (5) the kind of fruit and whether edible or poisonous; (6) the usual period of flowering and fruiting; (7) a brief description of the wood and its uses; (8) other uses of the tree and its products; (9) notes on propagation, growth rate, and site adaptability if available; (10) where the tree grows within Puerto Rico and the Virgin Islands; (11) the geographical distribution, including native home if introduced; (12) other common names listed by country and language, and (13) botanical synonyms in use.

For tree identification both volumes can be used best together, though each is an independent reference. Volume 1 describes in detail and illustrates 250 of the more common and more important native and exotic tree species, those most likely to be seen. The key to families (vol. 1, p. 21–27) covers both volumes, and there are keys to the species illustrated. For further identification, 130 additional, related species, including all other native trees of the same genera, are mentioned briefly. Thus, volume 1 has 380 species, about half of the total number, but lacks 190 genera and 31 families.

Volume 2 contains a slightly revised and enlarged key to families (pages 35–41) with 12 additions. For all 99 plant families in both volumes there has been inserted a paragraph of family description summarizing the main characters by which the family is known or identified in the area covered, also a page reference to each family in the first volume. There follows a key to the species covering both volumes. For the 250 species of the first volume the names of authors, also the preferred Spanish and English common names, have been added.

Species number 1–250 are in volume 1 and 251–750 in volume 2. The List of Tree Species following Contents at the beginning of each volume is arranged numerically by families. The Index of Common and Scientific Names (page 991) at the end of volume 2 covers both volumes and contains also several thousand other names in use through the New World.

With volume 2 alone, it is possible to find the name of any specimen by means of the keys to families and species. Identification of species in volume 1 may be confirmed by reference under the number of the description and drawing.

The Supplement to "Common Trees of Puerto Rico and the Virgin Islands" (Volume 1) at the close of this volume (page 984) contains some additional information about many species. Several changes in scientific names have been adopted to bring nomenclature up to date. Also, the notes on distribution by public forests have been expanded to include public parks.

A Spanish edition of the first volume was published by the University of Puerto Rico (*53*). That translation by José Marrero contains 48 colored plates by the late Frances W. Horne not available for the English book. However, the Spanish reference lacks the keys, notes on related species, and special lists that were added to the English manuscript after the former went to press. A Spanish edition of the second volume is planned.

WORK BY OTHERS

Preparing this book has called for full use of the previous work of botanists and foresters and also for additional field investigation. Puerto Rico and the Virgin Islands, discovered by Columbus, settled early, and both small and accessible, were among the first areas of tropical America to become well explored botanically. Principal publications on the plants of these islands are listed in the bibliographies by Britton and Wilson (*10*) and Otero, Toro, and

Pagán (*69*), the latter containing also a historical summary.

The most valuable reference consulted is the descriptive flora of Puerto Rico and the Virgin Islands by Britton and Wilson (*10*), published in English in 1923–30. Earlier, in 1903–11, Urban (*77*) wrote a flora of Puerto Rico in Latin and German. In 1883–88 there was published in Puerto Rico an incomplete flora in Spanish by Stahl (*74*), afterwards reprinted in 1936–37.

The Virgin Islands have been the subject of other floras, the earliest in 1793 by West (*81*), head of the school in St. Croix. It was in Danish with a German translation the next year. About a century later, Eggers (*21*) prepared a flora in English, and Millspaugh (*60*) another of the island of St. Croix. Britton (*9*) published a flora of the United States Virgin Islands in 1918, a year after their purchase from Denmark.

More than a century ago, José María Fernández (*22*, pp. 181–215) compiled a list of trees of Puerto Rico in his "Tratado de la Arboricultura Cubana," published in Havana in 1867. Entitled "Arbolado de Puerto-Rico," this annotated list contained about 175 trees arranged by Spanish common names with scientific names for about 100. Introduced, as well as native, species and several shrubs were mentioned. There were notes on size, occurrence, wood including specific gravity, and uses and also lists for special purposes.

Shortly after Puerto Rico became a part of the United States in 1898, studies of the forests began with a report by Hill (*29*) in 1899 which described 16 important timbers. In 1903 the Caribbean National Forest, now also Luquillo Experimental Forest, was established from former Spanish crown lands by proclamation of President Theodore Roosevelt. A preliminary list of trees of the Luquillo region was prepared soon afterwards by Gifford (*23*). Murphy (*62*), of the United States Forest Service, published a list of 292 tree species of Puerto Rico belonging to 172 genera and 57 families, with notes on size, distribution, wood, and uses by W. D. Brush, Louis S. Murphy, and C. D. Mell. Holdridge and Muñoz (*32*) described and illustrated seven poisonous trees in an article on the poisonous plants of Puerto Rico. In his manual on propagation of trees and establishment of forest plantations, Gilormini (*24*) inserted a list of native and exotic trees and shrubs of Puerto Rico with both Spanish and scientific names.

Much information about forest trees of Puerto Rico and the Virgin Islands is contained in articles in The Caribbean Forester (1940–1965) and other publications by the Institute of Tropical Forestry. Longwood (*54, 55*) of the United States Forest Service, made a special investigation of the woods of Puerto Rico and the Caribbean region, including about 70 species in volume 1. Other important references are mentioned below and listed under Literature Cited.

The agricultural experiment stations in Puerto Rico and the Virgin Islands have made additional studies of trees. Wolcott (*85, 86*) tested the resistance of woods to attack by drywood termites and also evaluated trees for roadside planting in relation to insect pests. Lists of shade and ornamental trees including those not recommended because of insect pests or diseases were prepared by Martorell (*56*). Núñez Meléndez (*64*) reported on the medicinal plants of Puerto Rico. Poisonous plants of the United States Virgin Islands, several being trees, were described and figured by Oakes and Butcher (*65, 66*).

The Agricultural Experiment Station at Mayaguez, Puerto Rico, under the United States Department of Agriculture, has introduced and tested many tropical plants from other lands, including some trees described here. Further information is contained in several publications. Winters and Almeyda (*84*) reported on the ornamental trees in Puerto Rico. Hume (*37*) discussed some ornamental shrubs for the tropics, and Winters (*83*) some large-leaved ornamentals. The common fruit trees were described and illustrated by Kennard and Winters (*39, 40*) in their publication on some fruits and nuts for the tropics. The large collection of introduced palms at Mayaguez was cited by Gregory (*28*).

Selected plants for screens, hedges, and windbreaks in the Virgin Islands have been described and illustrated by photographs in color (*77a*). Ornamentals for homes in Puerto Rico were shown in another publication.

Plant scientists from the Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland, have made plant collections in Puerto Rico as part of special projects. Quantities of vegetative material of certain species were obtained for screening tests of chemicals of possible medicinal value, such as in the treatment of cancer. Also, some experiments with herbicides in defoliation of tropical forest vegetation were made. One result was an illustrated key for identification of seedlings of woody species in eight forest types of Puerto Rico by Duke (*19*). Williams (*82*) compared the forests of Southeast Asia, Puerto Rico, and Texas.

Various other specialists have studied the trees and smaller plants of Puerto Rico and the Virgin Islands in the interval since the publication of the first volume in 1964 (or completion of the manuscript in 1955). Several collectors, sometimes working in taxonomic groups of their special interests, have deposited and thus

made available duplicate specimens in the National Herbarium of the United States National Museum of Natural History, Washington, D. C.

Liogier (*43, 44*) made large collections of herbarium specimens in Puerto Rico in 1960 and 1962. Among the trees were many range extensions, several new records for the island, and a few species new to science. A very useful list of nomenclatural changes and additions to Britton and Wilson's (*10*) flora of Puerto Rico and the Virgin Islands was prepared also by Liogier (*45, 46*).

Several studies of the plants of smaller islands of Puerto Rico and the Virgin Islands in recent years have contributed range extensions of tree species. D'Arcy (*17, 18*) has prepared lists of the dicotyledons of Tortola and the plants of Anegada, two of the British Virgin Islands. Woodbury, Martorell, and García Tudurí (*87*) have published a list of the flora of Desecheo. Also, Woodbury and Martorell have made extensive collections in several of the small islands around Puerto Rico for publication of lists with additional records. Among these are Mona, Caja de Muertos, and Icacos and the adjacent islands Palominos and Piñeros, and Culebra.

A very intensive investigation of the plant and animal life of El Verde, a plot of lower montane rain forest in the Caribbean National Forest (also Luquillo Experimental Forest), was conducted from 1963 to 1968 by the United States Atomic Energy Commission. Nearly one hundred scientists served as visiting participants in the researches on the effects of gamma irradiation, measurement of fallout elements, and analyses of energy flow and metabolic processes of the ecosystem. The results were published in a comprehensive reference of 111 chapters edited by Odum and Pigeon (*67*). Chapters on tree identification were contributed by Little (Ch. B-2; *51*), Duke (Ch. B-15; *19*), and Smith (Ch. B-16; *73*).

Dansereau and Buell (*16*) studied the vegetation of Puerto Rico from 1962 to 1965 under a contract with the Waterways Experiment Station (Vicksburg, Mississippi) of the United States Army Corps of Engineers. Their published report contains a map of the vegetation zones of Puerto Rico and a detailed study of the vegetation of the Roosevelt Roads area.

Howard (*36*) and associates have made extensive studies of the dwarf forest at Pico del Oeste (West Peak) in Luquillo Mountains within the Caribbean National Forest (Luquillo Experimental Forest), with financial assistance from the National Science Foundation. Also, along with detailed investigations of West Indian plants, Howard (*34, 35*) monographed the genus *Coccoloba* in Puerto Rico and the Virgin Islands and reported new records, including 2 shrub species new to science.

In the field of paleobotany, Graham and Jarzen (*27*) examined fossil pollen from lignite deposits of Oligocene age between Lares and San Sebastian in northwestern Puerto Rico. Though only about one-fourth of the samples could be named, the identifications contain several tree genera not now represented here. Among these are *Fagus, Liquidambar,* and *Nyssa* of temperate eastern United States. These genera reappear now southward on mountains of Mexico (*Liquidambar* also beyond to Nicaragua) but are absent from the West Indies. Also unexpected is the discovery of pollen of a few tree genera now found no nearer than the tropical forests of Central America and northern South America. Examples are *Bernoullia, Bombax, Catostemma,* and *Pelliciera.* Perhaps the most significant conclusion is that geologic time has been very long, even since the relatively young Oligocene epoch, for trees to migrate to Puerto Rico across oceans from both Central or North America and South America during different climatic periods and to become extinct later. Thus, time is an important factor in the explanation of present geographic distribution of tree species in Puerto Rico and the Virgin Islands.

A description of the forests of the British Virgin Islands was prepared by Beard (*7*), who published a land utilization map.

Additional information about the native and introduced trees is found in other publications. At the turn of the century, Cook and Collins (*13*) made a study of the economic plants of Puerto Rico. Food plants of the island were discussed by Barrett (*5*). Claus (*11*) studied the wind-pollinated plants. Principal edible and poisonous plants of the Caribbean region were described and illustrated by Dahlgren and Standley (*15*). Some trees were classed as honey plants by Ordetx (*68*), because their flowers attract bees and secrete nectar in quantities.

Many native and introduced tree species of Puerto Rico and the Virgin Islands are cultivated also in subtropical parts of the United States, and have been described in tree publications of those areas. Examples are the references mainly for Florida by Sturrock and Menninger (*75*), Menninger (*58, 59*), Morton and Ledin (*61*), Barrett (*4*), Watkins (*79*), and Schory (*72*).

Botanical floras and tree publications of various tropical countries, as well as taxonomic monographs, have provided useful information. Floras of other West Indian islands, such as "Flora de Cuba" by León and Alain (*42*), have been very helpful. The recent floras of Barbados by Gooding, Loveless, and Proctor (*26*) and Jamaica by Adams (*2*) have the current nomenclature.

PREPARATION OF THE TWO VOLUMES

Preparation of an illustrated popular reference on the trees of Puerto Rico was one of the first projects undertaken when, in 1939, the United States Forest Service began forest research in Puerto Rico with the establishment of the Tropical Forest Experiment Station, now Institute of Tropical Forestry, in Río Piedras. Leslie R. Holdridge, who was in charge of the project until the end of 1941, made botanical collections of Puerto Rican trees and supervised the preparation of a few hundred drawings. He wrote two preliminary volumes of "Trees of Puerto Rico" (*30, 31*) published in 1942 in both English and Spanish, each volume containing drawings and descriptions of 50 tree species. These small editions were soon exhausted. It was intended to issue additional parts covering a total of about 600 native and exotic tree species to be followed by a revision printed in a single volume. However, further work was suspended during World War II.

The herbarium of the Institute of Tropical Forestry (RPPR), mainly of tree specimens, was begun in 1932, though a few specimens were collected as early as 1929. Britton and Wilson (*10;* 6: 523) acknowledged the cooperation of W. P. Kramer of the Forest Service and worked also with other foresters. This herbarium has several tree specimens collected by Britton alone and with foresters in 1931–1932, on his last field trip there. Between 1932 and 1939 more than 500 herbarium specimens of trees were collected, the first mostly by Claud L. Horn and G. A. Gerhart. Other collectors during that period and after forest research began were Leslie R. Holdridge, Luis E. Gregory, and José Marrero. Many duplicates were deposited in the herbarium of the New York Botanical Garden and were identified there by Percy Wilson.

The present project on the trees of Puerto Rico and the Virgin Islands was begun by Little and Wadsworth in 1950. Wadsworth had assisted in the earlier project upon his arrival in Puerto Rico in 1942, while Little did some reference work in 1941. The area was expanded to include the nearby smaller Virgin Islands, both United States and British, which have fewer tree species and very few additions.

Little as dendrologist stationed in Washington, D. C., made field trips to Puerto Rico in 1950, 1952, 1954, and 1955, obtaining about 1,200 collector's numbers of tree specimens, some range extensions, and 1 new tree species (*48*). The botanical descriptions were prepared mostly by him from trees and living material supplemented by herbarium specimens.

Wadsworth, Director of the Institute of Tropical Forestry, has conducted forestry investigations in Puerto Rico continuously since 1942 and has studied many of these tree species in the forests and experimental plots. He prepared the chapter "Foresters and Forestry in Puerto Rico and the Virgin Islands," checked the descriptions, and contributed notes on wood and uses. Also, he compiled the data on propagation, growth rate, and site adaptability, and distribution by forest types.

The manuscript of the first volume was completed in 1955 and slightly revised in 1962 before publication in 1964. In the meantime José Marrero prepared the Spanish translation which went to the printers in 1960 and was published in 1967.

Preparation of the second volume was resumed in 1966. Roy O. Woodbury, plant taxonomist with the Agricultural Experiment Station of the University of Puerto Rico, Rio Piedras, was invited to be a coauthor. Coming to Puerto Rico in 1956 from south Florida, he made large plant collections, which were deposited in the herbarium of his institution. He found some range extensions and rediscovered several rare tree species, such as *Daphnopsis helleriana,* with Nevling (*63*). His detailed observations and unpublished notes based upon extensive field work over many years have been incorporated into the second volume.

Little made trips to Puerto Rico annually from 1966 to 1973 (except 1968). He and Woodbury obtained additional specimens, about 500 collector's numbers, there and in nearby small islands, also the Virgin Islands, for records, notes, and drawings. Wadsworth and Woodbury visited each public forest to compile lists of tree species and take field notes. A special effort was made to obtain additional information from the islands lacking detailed distribution records and from the four newly established national parks. Little (*50*) published a list of the trees of Jost Van Dyke. Woodbury and Little have prepared for publication a list of the seed plants of Buck Island Reef National Monument near St. Croix. The three authors made a list of the trees of Virgin Gorda, including Gorda Peak National Park. Little in 1954 and 1972 collected at Sage Mountain National Park. Woodbury prepared a list of the trees of Anegada. The flora of Desecheo by Woodbury, Martorell, and García Tudurí (*86*) has been mentioned earlier.

In checking the field identifications, the first author has examined the large collections from Puerto Rico and the Virgin Islands in the National Herbarium of the United States National Museum of Natural History, Washington, D.C. Sets of his specimens, totaling about 1,700 collector's numbers, have been deposited there and in the herbarium of the Institute of Tropical Forestry. Many duplicates have been sent to herbaria of the New York Botanical Garden, Harvard University, and other institutions.

PLAN

The plan of the second volume is essentially the same as that of the first. Thus, the explanation from the Introduction is repeated here with minor revision. A few differences may be noted. As previously mentioned, in this volume each plant family begins with a family description and a key to all of its species in both volumes. Forty minor species are described in a single long paragraph without drawing. There are no small maps showing distribution of native species by municipalities within Puerto Rico, because the forest inventory did not cover the less common trees. Distribution by individual islands belonging to Puerto Rico and the Virgin Islands is given in greater detail because of new information. Also, occurrence of native tree species is cited for the four public or national parks as well as public forests. Related species are not mentioned as they are in the keys and lists and are described in one volume or the other.

The 500 tree species of Puerto Rico and the Virgin Islands described in this volume are grouped by plant families in the usual botanical arrangement, almost the same as Britton and Wilson (*10*) and within each family alphabetically by scientific names. However, the three large subfamilies of the legume family (Leguminosae) often accepted as separate families are kept apart for convenience in identification.

Illustrations

Line drawings showing foliage and flowers and usually also the fruits face their respective descriptions for 460 species. Most are natural size, but some have been reduced to ⅔ and a few to ½ natural size as indicated. Also, most were made from fresh specimens in Puerto Rico.

Tree Names

The heading for the descriptive text of each species contains on the left the preferred common names in Spanish for Puerto Rico and in English for the Virgin Islands and on the right the accepted scientific name. An asterisk (*) after the scientific name means that the species (or family) is exotic, or introduced, and not native to Puerto Rico and the Virgin Islands. At the end of the text of each species are listed other common names in use and botanical synonyms, the other scientific names used formerly or sometimes now. These names appear also in the Index of Common and Scientific Names. English family names are derived from an important example, while scientific or Latin family names terminate in "-aceae" with few exceptions.

Preferred Common Names

Common names of trees often vary from place to place. One species may have several names in different areas, or the same name may be applied to unrelated trees in different regions. Still other species may sometimes lack a distinctive local name. The authors have attempted (1) to record all names commonly applied within this region to each species; and (2) to select as a preferred name the one most widely employed locally if not associated more commonly with another species. Since Spanish is the language of Puerto Rico, and English that of the Virgin Islands, two names are given for most trees present in both areas.

The Spanish common name in the heading is that preferable for Puerto Rico, based chiefly upon prevalent usage. The selection has been made after consultation with local botanists and with foresters both of the Commonwealth Department of Natural Resources and of the Institute of Tropical Forestry, United States Forest Service. The catalog of Spanish common and scientific names of Puerto Rico by Otero, Toro, and Pagán (*69*) has been an important additional source.

English common names in the heading include those in the Virgin Islands or in widespread use elsewhere. These preferred names, many of which were listed by Britton and Wilson (*10*) were checked in the field with rural inhabitants on different islands. For the species also native or naturalized in the United States, chiefly southern Florida, there is added the name accepted by the United States Forest Service in the Check List of Native and Naturalized Trees of the United States (*47*). For some less known species without local English names, those adopted elsewhere, such as in other West Indian islands, in Standardized Plant Names (*38*), or in commerce, have been accepted. Where two English common names are listed, the first is the local name in the Virgin Islands, and the second is either the Check List name adopted by the United States Forest Service and recommended for the United States or another name also widely employed. If no English name has been selected, the Spanish common name may be suitable.

The same Spanish common name may be applied independently to unrelated tree species, particularly in different localities or countries. In taxonomic groups with many similar species distinguished only by specialists, separate common names often are lacking. For example, the Spanish name "camasey" refers to many species in the large genus *Miconia* as well as to species of related genera in the family Melastomataceae. Similiary, "hoja menuda" is given to many species within the family Myrtaceae.

For about 75 species in the second volume, mostly rare, minor, or without special use, no preferred common name in either language has been noted. Some of these trees have common names elsewhere that could be taken up, but several introduced trees lack suitable equivalents. Common names of the genus or of related species often may be appropriate. The Latin generic name is always available for adoption as a common name. If further precision is desired, species may be distinguished by the translation of the specific epithet or by a descriptive name. Perhaps in time, appropriate common names will become established in usage for more trees.

Other Common Names

For Puerto Rico and the Virgin Islands many additional common names were obtained from local residents or taken from references, particularly Urban (*77*), Britton and Wilson (*10*), and Otero, Toro, and Pagán (*69*). Most of these have been verified, but several, apparently misapplied, have been omitted. As no Indian tribes have remained on Puerto Rico since the early Spanish settlement, there are now no separate aboriginal tree names. However, some Spanish names are of Carib Indian origin. Though the United States Virgin Islands belonged to Denmark until purchased by the United States in 1917, the tree names were English, and no Danish tree names are now recorded.

Principal common names in use in the New World have been compiled from many floras and tree lists of different countries, and some added from herbarium labels. These names often differ from country to country or from one island to another and may be in as many as five languages (Spanish, English, French, Dutch, and Portuguese), besides some of American Indian origin. Variant spellings, aboriginal names, long lists of local names within one country, and Old World names generally have been omitted. Other common names have been grouped by language and countries in the following order: Puerto Rico, Virgin Islands, Spanish, other Spanish-speaking countries in West Indies, and from Mexico to South America; United States, English, British lands, and other English-speaking countries; French, Haiti, French lands; Dutch Antilles, or West Indies and Surinam; and Brazil. Names in international commerce or lumber trade or so recommended are indicated. Some prefered names of Puerto Rico and the Virgin Islands are repeated under other common names to show usage elsewhere.

In the West Indian islands many tree names are not in the same language of the governing country, which may have changed one or more times since colonization. Persons migrating from one island to another have brought with them names from different languages. Some common names are corruptions from other tongues, such as French words somewhat modified in British areas. Various names have become adopted from Spanish, English, French, and Dutch into creole dialects. Also, European colonists often gave to tropical American trees the well-known names of similar though unrelated Old World species.

Scientific Names

Foresters, botanists, and other scientists use the scientific names in their technical writings and discussions. Being in Latin or Latinized, scientific names are definite and uniform and regulated by botanists under the International Code of Botanical Nomenclature. Thus, the Latin name of a tree or other plant species in an international language is the same throughout the world.

The scientific name of a species consists of two words: the generic name, which is capitalized, and the specific epithet. In some species, varieties are distinguished, being designated by a third word preceded by the abbreviation "var." References and technical publications cite also the author or botanist who first named and described the species, usually abbreviated if common or long. Where the name has been transferred from one genus or combination to another, the original author's name is placed in parentheses and followed by a second author, who made the change.

Botanical Synonyms

As some species have borne more than one scientific name, any botanical synonyms common in use, particularly in the West Indies, are listed. For example, a species may have been described independently by different botanists, or two species may have been united following later study of additional specimens. Also, there may be differences of opinion among specialists whether a variation merits recognition as a variety or separate species or needs no additional name. Included under botanical synonyms are those scientific names accepted by Britton and Wilson (*10*) but afterwards changed because of differences in codes of botanical nomenclature or in accordance with monographic studies and conservative usage.

Tree Descriptions

The descriptive text for each species begins with a summary of the main distinguishing characters, which is followed by size and appearance and by botanical descriptions of leaves, flowers, and fruits. Measurements of

trees and their parts are given in the English system of feet and inches. In conversion to the metric system, which is more commonly used in tropical America, these equivalents may be noted: 1 foot is 0.3048 meter, 1 inch is 2.54 centimeters or 25.4 millimeters, and ⅛ inch is approximately 3 millimeters.

Main Distinguishing Characters

The first paragraph summarizes the outstanding features for easy recognition, particularly leaves, flowers, and fruits. Mention is made of other characters useful in identification, such as distinctive bark or presence of latex or colored sap. Introduced trees are noted and indicated by an asterisk (*) after the scientific name.

Size and Appearance

In the second paragraph the approximate size is given as small (less than 30 feet tall), medium (from 30 to 70 feet tall), or large (more than 70 feet tall). The average and maximum heights and trunk diameters represent mature trees in Puerto Rico, though larger trees may have existed in the virgin forests within the island or elsewhere. Trunk measurements are diameters at breast height (d.b.h.) or 4½ feet. Trees are classed as evergreen if in full leaf through the year or deciduous if leafless or nearly so for a brief period, such as in the dry season of late winter. Buttresses, or enlarged narrow outgrowths at the base of the trunk of large trees continuous with lateral roots, are noted if present. Data on shape of crown, branching, and twigs are added for many species. Notes on bark include color of the surface and texture, whether smooth or rough, and if fissured (with many narrow thin cracks) or furrowed (with broad deep grooves). As most trees have thin bark less than ½ inch in thickness, mention is made of thick barks. Color and taste (also odor if present) are given for the inner bark, that is, the living tissues exposed by cutting beneath the surface, since these details often are helpful in field identification.

Leaves, Flowers, and Fruits

Because of their importance for identification, the leaves, flowers, and fruit are described in detail and with measurements for reference. However, characters emphasized in the first paragraph are not repeated below. Descriptive terms are defined under the topic "Explanation of Botanical Terms" (p. 12).

Months or seasons of flowering and fruiting, as far as known, have been compiled from various sources. For a few years personnel of the United States Forest Service made field observations of time of flowering and fruiting of many Puerto Rican tree species, which were summarized in a card file. Herbarium specimens collected by personnel of the Forest Service and others at different times of the year have contributed additional dates, as have the floras by Urban (*77*) and Stahl (*74*). Some tree species are cited as flowering and fruiting probably or nearly through the year. This statement means not that a particular tree bears flowers and fruits almost continually, but that on almost any date some trees may be found in bearing condition. An individual may have more than one blossoming period during the year. Generally flowering of trees is greatest from March to May, after the start of the spring rains.

Wood and Uses

Information on wood and its uses is given by species if known. However, many of the minor tree species in the second volume are noncommercial, being uncommon or small or introduced for other purposes. Notes on wood include color of sapwood and heartwood, hardness, weight and specific gravity, texture and durability. These notes are from Puerto Rican specimens and published descriptions from other areas. Detailed data on wood properties and uses were condensed from the publications by Longwood (*54, 55*) for many species in the first volume and a few in the second. Relative resistance of the wood to attack by dry-wood termites has been compiled from Wolcott (*86*). Uses of the wood are primarily those of Puerto Rico, but special and different uses elsewhere are mentioned. Most of the native woods are available only in limited quantities, and none is sufficiently abundant for export. Nevertheless, as Longwood reported, many of these woods could be utilized in additional ways.

Other Uses

Other purposes served by trees of Puerto Rico and the Virgin Islands are noted by species and in the Special Lists. Many kinds are planted for fruit, shade, ornament, and wood or more than one use. Others have bark that yields tannin, fibers, or dyes or have parts employed in home medicines. Some are classed as honey plants because their flowers attract bees and secrete nectar in quantities. Special mention has been made of the tree species introduced and hardy in subtropical parts of the United States, mainly southern parts of Florida, Texas, Arizona, and California.

Much information about other uses has been compiled from the references mentioned and listed under Literature Cited. Additional notes on uses elsewhere have been taken from floras, and tree books of tropical American countries.

Propagation, Growth, and Other Notes

Brief notes on propagation, growth rate, and site adaptability of some forest and planted trees have been summarized from records of the United States Forest Service and other sources. Miscellaneous notes of interest have been compiled and added. Further details and methods on propagation of trees in Puerto Rico are contained in the manual on that subject by Gilormini (*24*). Additional information on forest management of many Puerto Rican tree species may be found in various articles in The Caribbean Forester (1940–1965) and in publications of the Institute of Tropical Forestry.

Distribution

For each tree species the natural distribution or range is stated, both in Puerto Rico and the United States and British Virgin Islands and also beyond through the West Indies and continental tropical America. Introduced trees often spreading from cultivation and becoming naturalized, are further designated by mention of their native home.

Names of individual islands belonging to Puerto Rico and the Virgin Islands where each species is known are recorded. Sources include the published ranges by Britton and Wilson (*10*), later published and herbarium records, and field work by the authors. The first map (fig. 1) shows names and locations of the principal islands. Largest of those under Puerto Rico are Mona and Desecheo on the west and Culebra and Vieques on the east. Other small islands of botanical interest are Caja de Muertos on the south and Icacos, Palominos, and Piñeros on the east.

Occurrence in the Virgin Islands is cited in the following order: St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, Virgin Gorda, and Anegada. The first three are the United States Virgin Islands, while the last four as well as several smaller compose the British Virgin Islands.

Within Puerto Rico the distribution is recorded in greater detail by notes on abundance, altitudinal limits, and habitat or site. For many species are mentioned the forest regions or environments, or ecological regions or provinces. The natural distribution of most native trees tends to be related to ecological regions defined by climate and soil. These eight regions, shown in figure 3, define climax forests of distinct types. They are described in detail under Forests and Forestry (p. 20).

Public Forests and Parks

Distribution of the native tree species is cited also by public forests and parks, which are located on the maps (figs. 2, 4) and further described in the chapter Forests and Forestry in Puerto Rico and the Virgin Islands (page 20). The names of these widely scattered accessible areas indicate the general occurrence of a species and definite localities where most of the common species, as well as many rare ones, can be found. Lists of the tree species in each area could be prepared from these records.

Occurrence in the 15 public forests of Puerto Rico is listed in alphabetical order, as in the first volume, as follows: Aguirre, Boquerón, Cambalache Experimental Forest, Carite, Ceiba, Guajataca, Guánica, Guilarte, Luquillo Experimental Forest, Maricao, Río Abajo, San Juan, Susúa, Toro Negro, and Vega.

Four public parks have been established in the Virgin Islands since preparation of this reference was begun. Distribution is cited in this order: Buck Island Reef National Monument (north of St. Croix), Virgin Islands National Park (St. John), Sage Mountain National Park (Tortola), and Gorda Peak National Park (Virgin Gorda). In the absence of a separate published flora, all native tree species recorded from St. John are cited from Virgin Islands National Park, which covers most of that island.

Distribution Outside Puerto Rico

Ranges outside Puerto Rico are given for the islands of the West Indies in detail and also for continental tropical America. These ranges are based upon recent botanical floras, tree lists, and monographs supplemented by specimens in the National Herbarium of the United States National Museum. Distribution for many species now is somewhat better known than when summarized by Britton and Wilson (*10*). Some species have a broad range through the Greater Antilles (Cuba, Jamaica, Hispaniola, and Puerto Rico) and Lesser Antilles (Leeward and Windward Islands) to Grenada or Barbados and are present on nearly all the islands except the smallest or those lacking suitable habitats. Thus it has not seemed necessary to list all these islands. Nearly all Puerto Rican tree species native also in the island of Hispaniola are present in both Haiti and the Dominican Republic, which countries are not mentioned individually. For those species not ranging through the Lesser Antilles to Grenada, the southernmost island of distribution is recorded.

Islands near the Venezuelan coast of South America, including Trinidad and Tobago and Bonaire, Curaçao, and Aruba of the Dutch West Indies (Windward Islands), have the flora of the South American mainland rather than the West Indies. Nearly all native Puerto Rican tree species also on these islands have a broad distribution in the Caribbean area, such as from

Bahamas and Cuba to Trinidad and on the continent from Mexico through Central America to Venezuela or beyond.

The distribution of those species native or naturalized in the United States is given by States, generally only southern Florida, though mention is made of introduced trees planted and hardy from southern Florida to southern California. Southward on the continent the northernmost and southernmost countries of range limits are stated. Thus, a species recorded from Mexico to Peru and Brazil is native through the countries of Central America and northern South America. Some important cultivated trees are widely distributed almost throughout the tropics, including the Old World.

EXPLANATION OF BOTANICAL TERMS

Botanical descriptions for the classification and identification of trees are based principally on differences of leaves, flowers, and fruits, and their parts, such as presence or absence, number, arrangement, shape, size, and union or separation. To record these details, systematic botanists, or plant taxonomists, have a special terminology of technical words derived from Latin and Greek, defined and illustrated in botany textbooks and floras. In this book, nontechnical terms have been used wherever possible, though some technical terms have been inserted in parentheses or adopted where there was no clearer equivalent. Principal terms used in this book are explained here, while many are illustrated by the drawings. Thus, it has seemed unnecessary to include a glossary.

Leaves

These flat, green organs serving for food manufacture are very useful in the identification of trees, usually present in quantities and of large size. A tree that has green leaves persistent throughout the year is *evergreen;* one that sheds its leaves and is leafless part of the year is *deciduous.* The point on a twig where 1 or more *leaves* are attached is the *node.* In arrangement on the twig, leaves attached singly or 1 at a node are *alternate,* leaves borne in pairs or 2 at a node are *opposite,* and leaves inserted 3 or more at a node are *whorled.* Parts of a leaf are the leafstalk or *petiole* and the flat expanded part or *blade.* In some species there are 2 (or 1) scales at the base of a leaf called *stipules,* usually shedding early but sometimes forming distinctive buds at the end of a twig.

In number of blades a leaf with 1 blade is *simple,* while a *compound* leaf has usually several blades (rarely only 2) called *leaflets,* which may or may not have stalks. A leaflet is distinguished from a simple leaf by the absence of a bud at the base and by the shedding of the axis. Also, leaflets are in 2 rows along the axis, while simple leaves may be similar but more often not in 2 rows on the twig. Compound leaves are *pinnate* or pinnately compound when the leaflets are inserted along a common axis and *digitate* (or palmate) when attached together at the end of the petiole. If the axis has branches a leaf may be twice pinnate or *bipinnate* or if branched again the leaf is three times pinnate or *tripinnate.* Pinnate leaves may be *even pinnate* when the leaflets are paired and end in a pair, and *odd pinnate* when ending in a single leaflet.

Several terms describe the shape of leaf blades. A *linear* leaf has a narrow grasslike blade with edges parallel, and an *oblong* leaf is broader but with edges also nearly parallel. A *lance-shaped* or *lanceolate* leaf has the form of a lance, several times longer than broad, pointed at apex or tip end, and broadest near base, while the reverse shape is *oblanceolate.* An *ovate* leaf has an oval shape broadest toward the base, more or less as in an egg, while an *obovate* leaf is the reverse, broadest toward apex. An *elliptic* leaf has an oval shape but broadest in the center. A *circular* leaf has the blade more or less in form of a circle, while a *spatulate* leaf is spoon-shaped.

As to margin or edge a leaf blade may be toothed, lobed, without teeth, or rolled under. The apex and base of a leaf blade may be long-pointed, short-pointed, blunt, or rounded, or the base heart-shaped, if with two rounded lobes.

In venation or arrangement of the veins a leaf blade may be *parallel-veined,* if the veins are closely placed side by side or parallel; *pinnate-veined,* with a single main vein or midrib and lateral veins on both sides somewhat as in a feather; or *palmate-veined,* when several main veins arise at the base and spread like fingers in a hand.

Flower Clusters

The grouping of flowers and fruits in clusters (inflorescences) and their location and arrangement often provide characters useful in identification of trees. A flower cluster is *terminal* when it is at the apex or end of a twig and *lateral* when borne at the base of a leaf or on the side of a twig. The flowers may be produced singly, one by one. A *spike* is a flower cluster with elongated axis bearing stalkless flowers, while a *raceme* has an elongated axis with stalked flowers, and a *panicle* is a compound raceme with branched axis. An *umbel* has flowers on spreading stalks of equal length attached together at the apex of a larger stalk somewhat like an umbrella. A *head* bears stalkless flowers

on the broad disklike apex of the axis. In a *cyme* the flower cluster is definite, with the main axis ending in the first flower and with other flowers borne on branches below.

Flowers

For classification and identification of trees and other flowering plants, the flowers and fruits, or reproductive organs, are the most important parts. They show the relationships better than the leaves and other vegetative organs, which are less constant and often vary greatly under different environments. The commoner plant families can be recognized by their characteristic flowers. It has seemed desirable, therefore, to describe the flower structure of each tree species in simple terms with measurements.

The flower is a modified stem bearing four or fewer groups or circles of specialized leaves known as calyx, corolla, stamens, and pistil (or pistils). The *calyx*, or outermost group, is composed of reduced leaves generally green and called *sepals*, while the *corolla* consists of larger and usually colored parts known as *petals*. The corolla may be *regular* with equal petals or *irregular* with petals of unequal size and may be *tubular* with the petals united into a tube. The *stamens* or male organs of the flower have a *filament* or stalk and an *anther* or enlarged, usually yellow, part which bears the pollen, or male elements. Sometimes, the stamens may be replaced by *staminodes*, which are nonfunctional or sterile stamens, usually small.

In the center of the flower there is usually a single *pistil* or female organ (sometimes few to many) developed from one or more specialized leaves. The pistil consists of three parts: the *ovary* or enlarged part at the base, the *style* or stalk above the ovary, and the *stigma*, the usually enlarged and often sticky end, which receives the pollen. The ovary contains 1 to many *ovules*, rounded whitish female elements. The mature ovary is the *fruit*, while the ovules become the *seeds*.

In position with respect to the other flower parts, the ovary may be *superior* or *inferior*. The *superior ovary*, the common type, is free or separate in the center of the flower and inserted inward from or above the other parts. The *inferior ovary* is located below the calyx, corolla, and the stamens, which appear to be inserted above. The structure of the ovary, including the number of cavities or *cells* from 1 to several and number and position of the ovules within, is important in classification of plant families.

The *receptacle* is the enlarged base of the flower where the flower parts are inserted. Above the receptacle and inward from the corolla there is sometimes a *disk* or small part like a circle or ring, often glandular. The receptacle may form a basal tube or cup called the *hypanthium*, which may enclose the inferior ovary or sometimes surround the superior ovary and bear the other parts located above.

Though usually possessing stamens and pistil and thus with both sexes or *bisexual*, flowers may be of one sex only or *unisexual*. A *male* flower has stamens but no pistil, and a *female* flower has a pistil but no stamens. A species with male and female flowers on the same plant is said to be *monoecious*, while one with male and female flowers on different plants, which are also male or female, is *dioecious*. In *polygamous* species flowers of one sex and bisexual flowers are borne on the same individual.

Fruits

Developing from a mature ovary, the *fruit* contains the seeds and sometimes other flower parts still attached. Present often for longer periods than flowers or also remaining under the trees after falling, the fruits may be especially helpful in identification. Commonly the fruit originates from a single pistil and is *simple*. A fruit from several pistils in one flower is *aggregate* (for example, corazón or custard-apple), while one from several united flowers often partly from an enlarged fleshly stalk is *multiple* (for example, higo or fig).

Simple fruits are classed as *dry* or *fleshy* (juicy or succulent). Some dry fruits do not open to release the seeds (indehiscent), while others open (dehiscent). The *akene* is a dry fruit not opening and containing a single seed separate from the fruit wall. The *nut* is also 1-seeded with a thick hard shell. The *pod* or legume is a dry 1-celled fruit which splits open usually along 2 lines (for example, the legume family). The *capsule* is a dry fruit of 2 or more cells which opens on as many lines as cells. Fleshy fruits, which do not open, include the *berry*, which usually has several seeds, and the *drupe*, which has a central stone or hard part containing 1 or more seeds.

HOW TO USE THIS BOOK IN TREE IDENTIFICATION

Many trees can be identified by reference to the drawings, descriptions, and distribution notes. However, the illustrations alone may not emphasize differences among closely related species not figured. It is helpful to have for comparison the flowers and fruits in addition to foliage because many kinds of trees have leaves of similar shape. Often one tree can be found in blossom out of season, perhaps at the edge of a forest, and old fruits may be located on dead branches or on the ground. A ruler and a hand lens are useful in examining the specimen and comparing it with the description.

If the local common name of a tree in Puerto Rico or the Virgin Islands is obtained, such as by asking residents, then the description, illustration, and scientific name can be found by consulting the page listed in the Index of Common and Scientific Names. Since common names in other countries and as many as five languages are included, the Index will be helpful in determining the same species elsewhere.

To avoid errors, identification from a common name should always be verified by inspecting the drawing and comparing the specimen with the main distinguishing characters or, if needed, with the detailed description of leaves, flowers, and fruits. Otherwise, the use of the same common name for unrelated tree species in different places or misapplication of a name may lead to confusion.

The List of Tree Species following Contents in each volume will also aid identification because it lists the species of that volume in the usual botanical arrangement with related trees together, alphabetically by scientific names under each plant family. If the family is recognized, names of the examples with page numbers will be found in the Lists. Likewise, an unknown tree resembling a known one should be sought in both volumes under the same family.

The Key to Families, revised from that in volume 1, serves to place an unknown tree in its plant family. This key includes the families of both volumes. Each family with two or more species contains a key to these species for further identification.

The Special Lists may be helpful also in identifying trees with unusual characters or special uses.

Reference may be made also to Britton and Wilson's (*10*) flora of Puerto Rico and the Virgin Islands, which contains both technical keys to species and botanical descriptions but no illustrations. Also, botanical specimens of dried pressed twigs with leaves, flowers, and fruits, and with field notes (locality, altitude, date, common name, collector, whether wild or planted, size, abundance, etc.) may be forwarded to large herbaria or universities for identification by specialists, after prior arrangement.

STATISTICAL SUMMARY

A summary of the 750 tree species of Puerto Rico and the Virgin Islands described in the two volumes reveals the richness of the flora and the complexity of its origin. Of course, the number of tree species accepted for an area will depend upon the definition of a tree or minimum size considered. Trees may be defined as woody plants having one erect perennial stem or trunk at least 3 inches (7.5 centimeters) in diameter at breast height (d.b.h. or at 4½ feet or 1.4 meters), a more or less definitely formed crown foliage, and a height of at least 12 to 15 feet (4 meters). Accordingly, some small trees which are often shrubby have been included. Shrubby species rarely reaching the minimum size have been included, also a few tree-like or borderline. In the absence of similar publications about shrubs, perhaps these additions will be useful for identification.

The number of native species accepted here is 547, and the number of introduced species has been closed at 203 to make a rounded total of 750. Thus, nearly three-fourths (72.9 percent) are native and more than one-fourth (27.1 percent) introduced, indicated by an asterisk (*).

Britton and Wilson (*10*) mentioned about 700 introduced tree species, but many of these were limited to tests in horticulture or forestry. Some were unsuccessful or not superior to those already available. More recently additional species are being tested. Several ornamentals have become common following commercial production by local nurserymen. An effort has been made in these two volumes to describe all the common exotic trees, as well as several of special interest.

The 750 species of trees of Puerto Rico and the Virgin Islands described in the two volumes may be summarized by genera and plant families in the tabulation below:

	Volume 1	Volume 2	Both Volumes
Native species	178	369	547
Introduced species	72	131	203
Total species	250	500	750
Native genera	147	197	272
Introduced genera	38	76	104
Total genera	185	273	376
Native families	62	72	85
Introduced families	6	10	14
Total families	68	82	99

The largest plant families are listed below, with total number of tree species in both volumes, also introduced species in parentheses with asterisk (*). These 13 families, each with 15 or more species, contain 387 species, more than one-half the total of 750.

Leguminosae, 70 (41*)
- Mimosoideae, 25 (14*)
- Caesalpinioideae, 21 (15*)
- Faboideae, 24 (12*)

Myrtaceae, 54 (9*)
Rubiaceae, 48 (6*)
Euphorbiaceae, 36 (9*)
Melastomataceae, 35 (1*)
Rutaceae, 23 (10*)
Sapotaceae, 22 (2*)
Moraceae, 20 (11*)
Lauraceae, 17 (4*)
Bignoniaceae, 17 (8*)
Solanaceae, 15 (2*)
Flacourtiaceae, 15 (3*)
Palmae, 15 (5*)

Largest genera are listed below with total number of tree species in both volumes, including introduced species also in parentheses with

asterisk (*). These 21 genera together have 189 species, more than one-fourth of the total.

Eugenia, 26 (3*)	*Malpighia*, 7
Miconia, 17	*Guettarda*, 7
Coccoloba, 12	*Acacia*, 7 (3*)
Ficus, 12 (7*)	*Erythrina*, 7 (5*)
Ilex, 9	*Nectandra*, 6
Cordia, 9 (2*)	*Capparis*, 6
Ocotea, 8	*Solanum*, 6
Zanthoxylum, 8	*Antirhea*, 6
Calyptranthes, 8	*Tabebuia*, 6 (2*)
Cassia, 8 (6*)	*Annona*, 6 (4*)
Citrus, 8 (8*)	

An analysis of the geographic distribution of the tree species of Puerto Rico and the Virgin Islands contributes to an understanding of the relationships and origin. Urban (*77*, p. 675–689) summarized the plant geographic affinities of the flora of Puerto Rico. Gleason and Cook (*25*, p. 12–20) discussed the development of the flora of Puerto Rico and plant migration. Analyses of the trees of Mona Island and the Luquillo Experimental Forest were made by Little (*49, 51*).

Puerto Rico and the Virgin Islands as oceanic islands arose in the geological past from submarine volcanoes on the ocean floor and have not been connected with a continent, according to geological references. Thus, the tree species reaching these islands had to migrate over long expanses of ocean.

The 547 native tree species may be grouped into several classes according to their patterns of geographic distribution, approximately as follows:

- Also on continent, 229 species, 41.9%
  - Puerto Rico to South America and Central America (also Mexico and/or Florida), 121 species, 22.1%
  - Puerto Rico to South America (including Panama) only, 55 species, 10.1%
  - Puerto Rico to Central America (or Mexico or Florida), 53 species, 9.7%
- West Indies but not continent, 177 species, 32.4%
  - Greater and Lesser Antilles (including Bahamas) only, 80 species, 14.6%
  - Greater Antilles (including Bahamas and Virgin Islands) only, 77 species, 14.1%
  - Puerto Rico and Virgin Islands and Lesser Antilles only, 20 species, 3.7%
- Endemic to Puerto Rico and/or Virgin Islands, 141 species, 25.7%
  - Puerto Rico and Virgin Islands only, 21 species, 3.8%
  - Puerto Rico and adjacent island only, 6 species, 1.1%
  - Puerto Rico only, 109 species, 19.9%
  - Virgin Islands only, 5 species, 0.9%

Thus, according to the patterns of geographic distribution summarized above, many tree species of Puerto Rico and the Virgin Islands are widely distributed in continental tropical America. The main source of the original immigrants apparently was South America, because of the larger number of species in common, though Central America was another.

Many other tree species are confined to the West Indies and apparently developed in an island after migration from the continent. Most of these are native on two, three, or all four of the Greater Antilles, which may have been connected at times.

Perhaps of greatest interest are the tree species confined, or endemic, to Puerto Rico and the Virgin Islands. The tree species composing this class, more than one-fourth of the total, probably evolved on one of these islands from an original immigrant. The large number is evidence both of relatively ancient age of the islands and their isolation. Also, the eastern and western mountains of Puerto Rico were isolated further by climate as though separate islands.

ENDEMIC, RARE, AND ENDANGERED TREE SPECIES

Puerto Rico and the Virgin Islands, like other oceanic islands isolated from continents, are rich in local and endemic plant species found nowhere else. It is important to prepare a list of these local tree species to determine which are rare and endangered and in need of measures for protection. A compilation has been made from the ranges of the 547 native tree species in both volumes.

Within the Luquillo Experimental Forest, Little (*51*) listed 61 tree species endemic to Puerto Rico, of which 26 were endemic to Luquillo Mountains or slightly beyond. Weaver (*80*) cited 28 species including 18 of trees as endemic to the Luquillo Mountains and found in the dwarf forest.

As summarized here, the endemic tree species total approximately 141 or 25.8 percent, of which about 79 may be classed as either rare or endangered. A more detailed report will be published separately. First, a few standard definitions.

Endemic, or local, species are those whose natural range is local or limited to the area of study, usually small, and in this reference to Puerto Rico and the Virgin Islands.

Rare species occur in small numbers, usually in limited range, or in such restricted or specialized habitat that they could disappear, though not in immediate danger of extinction.

Endangered species are in immediate danger of extinction and unlikely to survive without

special protection measures; occurring in small numbers usually in limited range.

Peripheral (border) species are rare at the edges of their ranges but not in danger of extinction because of occurrence in greater numbers elsewhere.

Extinct species are no longer known to exist anywhere after search. Species that have disappeared from one island but not others are not extinct.

Several tree species have ranges almost confined to Puerto Rico but have been found also in one or more nearby islands, such as the northernmost Lesser Antilles or Hispaniola. For example, *Stahlia monosperma*, long regarded as a species (and genus) endemic to Puerto Rico and Vieques, has been discovered also in eastern Hispaniola. These species have been excluded from the list of endemics. Also, the list may be reduced further by similar range extensions in the future and by union of species named independently on different islands.

Of the 141 endemic, or local, tree species, 112 are described in this volume and followed by the letter (E) in "List of Tree Species" (pages iv–xiv). The 72 endemic species of this volume classed also as rare or endangered are further designated by the letter (R). Table 1 similarly lists the 29 endemic species of volume 1 and the 7 classed also as rare or endangered. Thus, 79 of the 112 endemics, or 70.5%, occur in small numbers usually in limited range and could disappear if not protected.

The two volumes on trees of Puerto Rico and the Virgin Islands contain additional information about the 141 endemic tree species, particularly their distribution within the islands and their occurrence in public forests and parks. There are original drawings for 133, the first ever published for most of these. (Four of the 8 not illustrated are poorly known and not found in recent years.) However, water-color drawings of several endemic tree species by Frances W. Horne appeared many years ago in Addisonia, accompanied by descriptions by Nathaniel L. Britton. The Spanish translation of the first volume (*53*) contains 6 endemics among its 48 color illustrations by the same artist.

Most of these endemic species grow wild within one or more of the public forests of Puerto Rico. However, the 19 rare and endangered (E, R) species listed below are not found on any public forest or park but are confined to privately owned lands. The list should be reduced, because a few are poorly known or were named from incomplete or sterile specimens.

Calyptronoma rivalis
Sabal causiarum
Acacia anegadensis
Zanthoxylum thomasianum
Malpighia shaferi
Buxus vahlii
Maytenus cymosa
Sida eggersii
Banara vanderbiltii
Daphnopsis hellerana
Calyptranthes kiaerskovii (Tortola only; flowers and fruits unknown; not found)
Calyptranthes portoricensis
Calyptranthes thomasiana
Eugenia boqueronensis (fruit unknown; not found)
Eugenia (?) *corozalensis* Britton (flowers and fruits unknown; not found)
Eugenia serrasuela (flowers and fruits unknown; not found since 1881)
Eugenia sessiliflora
Antirhea portoricensis (weak species named in 1930, not distinguished, related to *A. sintenisii*)
Antirhea sintenisii

Of the list above, perhaps the rarest tree species in Puerto Rico is *Banara vanderbiltii*, represented by only 2 known trees on a farm near Bayamón. The rarest in the Virgin Islands may be *Sida eggersii*, now known from 1 tree at Jost Van Dyke.

The table below summarizes the numbers of endemic species native in several public forests. The endemic species are mostly in the mountain zone. Luquillo Experimental Forest has the highest number, 62 out of 141, including about 23 known only from Luquillo Mountains or also Carite. Maricao, Toro Negro, and Carite follow but have almost no local endemics. Guánica in the low dry zone has only 11 of the endemics and 1 apparently confined to that vicinity.

	Within public forest	Known only from public forest
Luquillo	62	[1]23
Maricao	52	2
Toro Negro	45	1
Carite	38	0
Susúa	24	0
Guánica	11	1

[1] (A few of these also Carite.)

Most of the 141 tree species endemic to Puerto Rico and the Virgin Islands, designated by (E), are native only within Puerto Rico. However, about 30 species in the next three lists are present on other islands.

These 6 tree species are known only from Puerto Rico and 1 adjacent island, as stated:

Ficus stahlii (Mona)
Malpighia shaferi (Vieques)
Rheedia portoricensis (Vieques)
Eugenia xerophytica (Isla Muertos)
Bumelia krugii (Vieques)
Eupatorium portoricense (Vieques)

The following 21 tree species are known only from Puerto Rico and also 1 or more of the Virgin Islands:

Acrocomia media	*Ilex urbaniana*
Coccothrinax alta	*Maytenus cymosa*
Roystonea borinquena	*Reynosia guama*
Neea buxifolia	*Ouratea littoralis*
Erythrina eggersii	*Eugenia sessiliflora*
Pictetia aculeata	*Psidium amplexicaule*
Sabinea florida	*Miconia thomasiana*
Zanthoxylum thomasianum	*Lyonia rubiginosa*
Croton rigidus	*Chrysophyllum pauciflorum*
Buxus vahlii	*Manilkara pleeana*
	Cordia ricksecker i

Four tree species are endemic to one or more of the smaller islands and obviously are endangered because of their very restricted area. *Acacia anegadensis* is confined to Anegada. *Malpighia pallens* is limited to St. Croix and Buck Island, though recorded also from Cuba. *Sida eggersii* is known now from only 1 tree at Jost Van Dyke, though it was named from Tortola and was collected twice at Culebra. *Calyptranthes thomasiana* occurs on St. Thomas and Vieques. A fifth species, *Calyptranthes kiaerskovii*, was named in 1895 from a sterile specimen from Tortola and has not been found or identified further.

No endemic tree species of Puerto Rico and the Virgin Islands is known to have become extinct. Nearly all the endemic tree species named long ago from Puerto Rico or the Virgin Islands have been found by later collectors including the present authors. Several not collected by Nathaniel L. Britton and associates during the preparation of the flora (*10*) have been rediscovered in recent years. Others probably could be located after special search. However, a few described from incomplete specimens, cited in the list above, have not been found.

Specimens of *Pleodendron macranthum* were collected by foresters in Luquillo Mountains in 1940 but not afterwards. As the habitat has been protected, this species probably could be located in a special search. *Styrax portoricensis* was found by one of the authors recently, not only in Luquillo Mountains but also in Carite, a range extension. One lost endemic, *Goetzea elegans*, was rediscovered by foresters in 1936 and was found on the Cambalache Experimental Forest in 1950 and later at other localities.

Very few tree species new to science have been found in recent years in Puerto Rico and none in the Virgin Islands. After the completion of the flora by Britton and Wilson (*10*), only the following 8 new tree species have been published from here by later authors:

Linociera holdridgii Camp & Monachino (Lloydia 2: 223. 1939)
Myrica holdridgeana Lundell (Contrib. Univ. Mich. Herbarium 7: 5. 1942)
Licaria brittoniana Allen & Gregory (Brittonia 7: 267. 1951)
Byrsonima wadsworthii Little (Phytologia 4: 417, fig. 1953)
Calyptranthes luquillensis Alain (Torrey Bot. Club Bul. 90: 189. 1963)
Eugenia haematocarpa Alain (Torrey Bot. Club Bul. 90: 190. 1963)
Phialanthus grandifolius Alain (Torrey Bot. Club Bul. 92: 302. 1965)
Alsophila bryophila Tryon (Rhodora 74: 443, figs. 9–10. 1972)

All 8 are endemic to Puerto Rico. Because of their restricted area, four of the above are classed also as rare and endangered (R), namely: *Myrica holdridgeana, Calyptranthes luquillensis, Eugenia haematocarpa,* and *Linociera holdridgii.* Several other new species described as shrubs have not been included, though a few may be observed later to attain tree size.

A few tree species of nearby islands were discovered also on Puerto Rico by nineteenth century collectors but were not found here by later collectors. Now all of these peripheral species have been rediscovered except *Juglans jamaicensis* and *Urera caracasana.* The last collection of *Juglans jamaicensis* in Puerto Rico was in 1915. The forested area of its occurrence is now mostly in coffee plantations. However, a careful search might be rewarding. This species is native of Hispaniola and Cuba and is not endangered. *Urera caracasana,* a species widespread on the continent and found also in the Lesser Antilles and Jamaica, was collected long ago in the Luquillo Mountains. It apparently was the ancestor of the endemic species *U. chlorocarpa.*

In spite of thorough collecting during the past two centuries, a few range extensions of tree species new to Puerto Rico have been found in recent exploration. *Conostegia hotteana* Urban & Ekman, of Haiti, was recorded from the Luquillo Mountains by Howard (*35*) and found also by Woodbury at Carite Forest. Alain Liogier (*43, 44*) has published a number of new plant records for Puerto Rico including

several tree species new to the island, most of which were collected independently by the authors. Examples are: *Calyptranthes pallens, Chione seminervis, Linociera ligustrina, Lunania buchii, Solanum antillarum, Xylosma schaefferioides,* and *Zanthoxylum bifoliolatum.* Woodbury found one tree of *Pseudophoenix sargentii* at Mona Island.

Besides the endemics, about 79 other species of native trees could be classed as rare or endangered in Puerto Rico or the Virgin Islands. These additional rare or endangered species may be cited by number, as follows: 254, 268, 281, 285, 297, 300, 306, 314, 315, 318, 322, 324, 325, 335, 336, 338, 339, 341, 353, 375, 393, 394, 403, 406, 408, 409, 410, 417, 421, 423, 424, 436, 438, 450, 453, 458, 460, 476, 477, 489, 492, 494, 508, 510, 511, 528, 529, 531, 535, 539, 558, 574, 578, 593, 597, 599, 604, 606, 609, 612, 618, 630, 638, 643, 646, 654, 660, 663, 676, 677, 683, 695, 698, 719, 723, 724, 740, 745, 747.

Common and scientific names may be found under "List of Tree Species" (pages iv–xiv). The native range elsewhere is stated under the description of each species. Thus, disappearance here would not mean extinction. Some are peripheral (border) species rare here at the edges of their ranges but more common on other islands. For many of these species the public forests and parks of Puerto Rico and the Virgin Islands provide protection, as well as accessible localities for study. Also, most of these species are not native elsewhere within the United States.

Thus, about 158 tree species native in Puerto Rico and the Virgin Islands, more than one-fourth or 28.8% of the total of 547, may be classed as rare or endangered here. About 79 are endemic and 79 also on other islands.

The number of rare native tree species of Puerto Rico not yet discovered probably is very small. The native tree species of Puerto Rico and the Virgin Islands, as accounted for in this 2-volume reference, are probably about as well known as those of any comparable area in tropical America.

ACKNOWLEDGMENTS

Credit is due various persons of the United States Forest Service, past and present, for their assistance in preparing this book, first to Leslie R. Holdridge. He initiated the project, made extensive botanical collections, supervised drawing of numerous illustrations (also making a few), and wrote the two preliminary volumes (*30, 31*). In those volumes acknowledgment was made to assistance in the preparation of the material by personnel of Work Projects Administration Official Project No. 165–2–36–20.

The 460 line drawings of this volume were prepared at different times by several artists and botanists, whose aid is gratefully acknowledged. Many illustrations for both volumes were skillfully executed in the early 1940's by employees of the United States Forest Service and Work Projects Administration, among them Francisco Roena Santiago and José Gabriel Arroyo. While working on the first volume in 1954, Edwin C. Rivera S. made several illustrations for the second. In 1966 Edwin Villalón and Carmen M. Díaz prepared many. The remaining drawings were made in Washington, D. C., by Suzanne Foster Manley, Hazel M. Hartman, Marion D. Shoquist, and Barbara H. Honkala. About 10 others were prepared by Ruby Rice Little and Ellen de Jürgenson for a similar book on the common trees of Venezuela by the first author. The drawing of *Castela erecta* is from Hooker (*33*, pl. 55), that of *Euphorbia cotinifolia* from Dahlgren and Standley (*15*), and that of the cone of *Araucaria heterophylla* from Barrett (*6*, fig. 6).

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Several specialists reviewed portions of the manuscript. These include: David B. Lellinger, Cyatheaceae; Robert W. Read, Palmae; Velva E. Rudd, Leguminosae; John J. Wurdack, Melastomataceae; and Harold N. Moldenke, Verbenaceae. Hugh H. Iltis checked the names in Capparaceae. The treatment of the genus *Coccoloba* (Polygonaceae), the third largest in number of native tree species, follows the revision of the Puerto Rican species by Howard (*34*). Scientific names in Cyatheaceae follow the classification by Tryon (*76*). Rogers McVaugh reviewed the names in Myrtaceae.

Luis F. Martorell reviewed the manuscript, assisted with the Puerto Rican common names and contributed notes on insect pests and diseases. Alain H. Liogier, besides reviewing the manuscript, has contributed many common names used in Hispaniola.

TABLE 1.—Tree species of volume 1 endemic to Puerto Rico and the Virgin Islands (E) and rare or endangered (R). To be added to species so designated in List of Species of volume 2 (p. iv–xiv).

Palm family (Palmae)

4. Corozo, prickly-palm, Puerto Rico acrocomia, *Acrocomia media* O. F. Cook (E, R)
5. Palma de coyor, *Aiphanes acanthophylla* (Mart.) Burret (E, R)
8. Palma de lluvia, *Gaussia attenuata* (O. F. Cook) Beccari (E, R)
9. Palma real, royal palm, Puerto Rico royalpalm, *Roystonea borinquena* O. F. Cook (E)
10. Palma de sombrero, Puerto Rico palmetto, *Sabal causiarum* (O. F. Cook) Beccari (E, R)

Magnolia family (Magnoliaceae)

34. Jagüilla, *Magnolia portoricensis* Bello (E)
35. Laurel sabino, *Magnolia splendens* Urban (E)

Laurel family (Lauraceae)

49. Nuez moscada, *Ocotea moschata* (Meisn.) Mez (E)

Rose family (Rosaceae)

57. Icaquillo, *Hirtella rugosa* Pers. (E)

Milkwort family (Polygalaceae)

117. Violeta, violet-tree, *Polygala cowellii* (Britton) Blake (E, R)

Spurge family (Euphorbiaceae)

120. Sabinón, *Croton poecilanthus* Urban (E)
126. Cedro macho, *Hyeronima clusioides* (Tul.) Muell.-Arg. (E, R)
129. Tabaiba, *Sapium laurocerasus* Desf. (E)

Soapberry family (Sapindaceae)

142. Serrasuela, *Thouinia portoricensis* Radlk. (E)
143. Ceboruquillo, *Thouinia striata* Radlk. (E)

Mallow family (Malvaceae)

151. Maga, *Montezuma speciosissima* Sessé & Moc. (E)

Tea family (Theaceae)

160. Maricao verde, *Laplacea portoricensis* (Krug & Urban) Dyer (E, R)

Mangosteen family (Guttiferae)

165. Palo de cruz, *Rheedia portoricensis* Urban (E)

Mezereon family (Thymelaeaceae)

177. Majagua brava, *Daphnopsis philippiana* Krug & Urban (E)

Myrtle family (Myrtaceae)

185. Limoncillo, *Calyptranthes krugii* Kiaersk. (E)
191. Guayabota, *Eugenia stahlii* (Kiaersk.) Krug & Urban (E)

Melastome family (Melastomataceae)

196. Jusillo, *Calycogonium squamulosum* Cogn. (E)
197. Camasey peludo, *Heterotrichum cymosum* (Wendl.) Urban (E)

Sapodilla family (Sapotaceae)

212. Caimitillo verde, *Micropholis garciniifolia* Pierre (E)

Borage family (Boraginaceae)

222. Muñeco, *Cordia borinquensis* Urban (E)

Bignonia family (Bignoniaceae)

235. Roble cimarrón, *Tabebuia haemantha* (Bert.) DC. (E)
237. Roble de sierra, *Tabebuia rigida* Urban (E)

Madder family (Rubiaceae)

239. Quina, *Antirhea obtusifolia* Urban (E)
248. Juan tomás, *Rondeletia portoricensis* Krug & Urban (E)

Volume 1: Endemic (E), 29 species; also rare or endangered (R), 7 species
Volume 2: Endemic (E), 112 species; also rare or endangered (R), 72 species
Totals: Endemic (E) 141 species; also rare or endangered (R), 79 species

FORESTS AND FORESTRY IN PUERTO RICO AND THE VIRGIN ISLANDS

The trees native to Puerto Rico and the Virgin Islands, about 547 species, were found at the time of discovery in extensive and luxuriant forests. Whereas such forests have subsequently all but disappeared, there is every reason to believe that at the time of Columbus' arrival the dominant vegetation throughout the islands, with the possible exception of a few small marshes, was forest. The reports of early voyageurs (*1, 20, 57*) all describe the islands as forest covered. Furthermore, in other regions of similar climate and soil the vegetation is forest wherever it has not been modified by man.

The natural vegetation of Puerto Rico, including forests and plant successions, has been described by Gleason and Cook (*25, 12*), Dansereau and Buell (*16*), and others. Mapping of life zones as a basis for further identification of major categories of natural vegetation has recently been completed by Ewel and Whitmore (*21a*).

THE VIRGIN FORESTS

Description of the virgin forests of Puerto Rico and the Virgin Islands can now be only very approximate, since few relics remain in Puerto Rico and none in the Virgin Islands. Wherever partial cutting or complete deforestation has once taken place, even where forests are subsequently allowed to redevelop, the relative abundance of the different species suffers a marked change. The brief description repeated here from the first volume (*52*) is based upon a study of a few remaining virgin forests in Puerto Rico (*78*) and upon published descriptions of similar forests in nearby islands, particularly those by Beard (*7, 8*).

The eight climax forest types or forest regions shown in figure 2 are described below with lists of the common trees. Reference is made primarily to Puerto Rico, and some species mentioned are not in the Virgin Islands. However, the general character of the vegetation there was apparently as here described.

The more important differences in the natural vegetation of Puerto Rico and the Virgin Islands reflect variations in topography, climate, and soil. The vegetation of the coastal plains was unlike that of the steeper slopes, and a still different type of forest clothed the upper most peaks. Differences in the total amount an seasonal distribution of precipitation produce extreme differences between the forests of th eastern mountains of Puerto Rico and those o the southwest coast. Reduced moisture avai ability due to shallow soils, particularly in th limestone regions, is manifest in the growth o trees on such areas. The contrasts among th various vegetative types are striking because o the extreme range of conditions within shor distances. Elevations range from sea level t 4,398 feet, precipitation from 30 to 180 inche annually, and soils from deep to very shallow and from fine clays to coarse sands.

Along the wind-swept seacoasts was a lo scrubby littoral woodland so narrow and s small in area that it is not shown in figure 3 Most of the trees in this woodland were sma and of poor form due to extreme exposure t salt winds. On dry rocky slopes facing th southern or southwestern coasts, on Anegada on Mona, and other small outlying islands th littoral woodland assumed the form of cactu scrub. In the more protected locations, particu larly on the north coast of Puerto Rico, gre trees of good timber species such as marí (*Calophyllum calaba*), ausubo (*Manilkara b dentata*), roble (*Tabebuia heterophylla*), an tortugo amarillo *Sideroxylon foetidissimum*) One of the most prominent species near th shore was uva de playa (*Coccoloba uvifera*)

Along the shores of protected bays, lagoon and estuaries in an area too restricted to sho in figure 3 were dense stands of mangrove, th trees of only four species growing to a height o 60 feet or more. Five public forests borderin the coast, mapped in figure 4, still contain ma groves. In the water itself was mangle colorad (*Rhizophora mangle*). On the adjacent are normally subject to tidal flooding were mang blanco (*Laguncularia racemosa*) and mang negro (*Avicennia germinans*). On the lan ward side was mangle botón (*Conocarpu erectus*). The strong durable timbers of mang colorado and mangle botón were much used fo construction.

On the coastal plain and lower slopes, up to a elevation of 500 feet or more in Puerto Ric and to the tops of most mountains of the Virgi

Islands grew a forest which was largely evergreen but with some deciduous species, particularly in the drier coastal areas. At its best development, on the northern coastal plain of Puerto Rico, this forest attained 80 feet or more in height. Elsewhere, in the moist limestone region, on the south coast of Puerto Rico, and in the Virgin Islands, it was apparently shorter, from 40 to 60 feet tall. This forest consisted of two tree stories, each composed of distinct species. The lower story constituted a forest within a forest and depended upon the upper canopy for its existence. The vegetation varied in composition from place to place but it was everywhere a mixture of species. At least 200 tree species were present somewhere within the natural distribution of this forest.

Within the area described are four distinct forest regions or ecological provinces, each giving rise to a distinct type of forest. These regions or provinces, designated as moist coast, moist limestone, dry coast, and dry limestone, are shown in figure 3.

The more common or characteristic species of the moist coastal forest included the following:

Acrocomia media
Nectandra coriacea
Hernandia sonora
Hymenaea courbaril
Andira inermis
Pterocarpus officinalis
Zanthoxylum martinicense
Calophyllum calaba
Mammea americana
Manilkara bidentata
Sideroxylon foetidissimum
Citharexylum fruticosum
Petitia domingensis
Tabebuia heterophylla
Genipa americana
Guettarda scabra
Randia aculeata

The moist limestone forest was similar to that along the coast and had many of the same species. The chief differences appear to be due to the drier soils on the well-drained limestone hills and the greater humidity in the protected areas between the hills, especially in the southern part of this area which is close to the central mountains. The tree species of the moist limestone forest include:

Aiphanes acanthophylla
Gaussia attenuata
Coccoloba diversifolia
Coccoloba pubescens
Licaria salicifolia
Zanthoxylum martinicense
Bursera simaruba
Cedrela odorata
Hyeronima clusioides
Sapium laurocerasus
Thouinia striata
Montezuma speciosissima
Ochroma pyramidale
Clusia rosea
Bucida buceras
Tetrazygia eleagnoides
Dipholis salicifolia
Sideroxylon foetidissimum
Guettarda scabra
Terebraria resinosa
Randia aculeata

On the southern, dry side of Puerto Rico the more adverse moisture conditions excluded many of the tree species common on the north side. In their places grew a few other species especially adapted to such conditions. The tree species of the dry coastal forest include:

Coccoloba venosa
Capparis cynophallophora
Stahlia monosperma
Lonchocarpus domingensis
Pictetia aculeata
Erythroxylum areolatum
Guaiacum officinale
Polygala cowellii
Ceiba pentandra
Guazuma ulmifolia
Canella winterana
Bucida buceras
Rauvolfia nitida
Cordia nitida
Citharexylum fruticosum

In the limestone region of the south coast, as on the north coast, excessive soil drainage accentuates the dryness of the environment to a point that some species of trees cannot subsist. Others which are more hardy replace these. The trees of the dry limestone forest include:

Pisonia albida
Capparis cynophallophora
Pictetia aculeata
Guaiacum officinale
Guaiacum sanctum
Amyris elemifera
Bursera simaruba
Gymnanthes lucida
Thouinia portoricensis
Colubrina arborescens
Ziziphus reticulata
Cephalocereus royenii
Opuntia rubescens
Bucida buceras
Dipholis salicifolia
Plumeria alba

The coastal forests of Puerto Rico and the Virgin Islands, unlike those of the other Greater Antilles, contained no mahogany (*Swietenia mahagoni*). Widespread use of the wood and early introduction of the tree to these islands has led to a general impression that this species is native. However, whereas the young trees develop abundantly in Puerto Rico beneath or near planted trees of this species, they are never encountered in native forest at any distance from such trees. Had the species been native, there would still be young trees throughout the coastal forests of the island without relation to the location of planted trees. It is extremely unlikely that it could ever have been exterminated, since aceitillo (*Zanthoxylum flavum*), a tree in greater demand and with much weaker reproductive capacity than mahogany, is still to be found in remote forests.

Typical mountain forests are confined to Puerto Rico, although a small patch of similar but unique forest is found on the top of Sage Mountain, Tortola. Between about 500 to 2,000 feet elevation in the eastern mountains, known as Luquillo Mountains, and to 3,000 feet in the central mountains or Central Cordillera, slightly higher on the south slope than on the north, was probably the most magnificent forest of Puerto Rico. Much of the original vegetation of this area is described as wet forest. At its maximum development this forest reached 110 feet in height, with trees to 8 feet in diameter.

Three forests of distinct size and composition grew together here, each forming a separate story of vegetation. Throughout the range of this type of forest there were probably about 170 tree species.

Within the lower mountain area are two forest regions or ecological provinces and corresponding distinct forest types. These provinces are designated as lower Cordillera and lower Luquillo. It is seen in figure 3 that the lower Cordillera province includes both the north and south lower slopes of the central mountains of Puerto Rico and the Sierra de Cayey and also the upper slopes of the disconnected Sierra de Atalaya in the northwest. The Luquillo Mountains are separate both geographically and ecologically from the Central Cordillera.

The trees of the lower Cordillera forest include the following:

Cyathea arborea
Cecropia peltata
Ocotea leucoxylon
Ocotea moschata
Hirtella rugosa
Inga fagifolia
Pithecellobium arboreum
Andira inermis
Ormosia krugii
Dacryodes excelsa
Cedrela odorata
Guarea guidonia
Byrsonima coriacea
Drypetes glauca
Cupania americana
Meliosma herbertii
Casearia arborea
Homalium racemosum
Buchenavia capitata
Myrcia deflexa
Dendropanax arboreus
Didymopanax morototoni
Linociera domingensis
Cordia alliodora
Cordia borinquensis
Cordia sulcata
Vitex divaricata
Tabebuia heterophylla

The forest of the lower slopes of the Luquillo Mountains is similar in general appearance to that in the Cordillera, but because of greater precipitation and higher humidity it is somewhat more luxuriant, and several tree species are much more common here than elsewhere. The trees of the lower Luquillo province include the following:

Cyathea arborea
Cecropia peltata
Beilschmiedia pendula
Ocotea leucoxylon
Ocotea moschata
Hirtella rugosa
Inga fagifolia
Andira inermis
Ormosia krugii
Dacryodes excelsa
Tetragastris balsamifera
Guarea guidonia
Trichilia pallida
Byrsonima coriacea
Alchorneopsis portoricensis
Drypetes glauca
Sapium laurocerasus
Cupania americana
Meliosma herbertii
Sloanea berteriana
Ochroma pyramidale
Casearia arborea
Buchenavia capitata
Myrcia deflexa
Manilkara bidentata
Linociera domingensis
Cordia borinquensis
Tabebuia heterophylla

The similar forest on the top of Sage Mountain, Tortola, does not exceed 60 feet in height, apparently because of a somewhat drier cl mate. It contains many species associated wit this forest in Puerto Rico and is dominated a most exclusively by bulletwood (*Manilkara b dentata*).

Farther up the slopes in Puerto Rico, extenc ing to near the tops of the peaks, was a sul tropical and lower montane rain forest. Her the temperature is lower, and rainfall, rangin from 100 to possibly 200 inches annually is s abundant as to produce swampy conditions an highly leached soils. The result was a compara tively poor forest about 60 feet tall and contair ing about 60 tree species.

This upper mountain forest is distinct in th Cordillera and the Luquillo Mountains pr marily because of more moist conditions in th latter. The common or characteristic tree spe cies of the upper Cordillera forest include:

Cyathea arborea
Prestoea montana
Magnolia portoricensis
Guatteria blainii
Ocotea spathulata
Brunellia comocladifolia
Alchornea latifolia
Turpinia paniculata
Matayba domingensis
Clusia grisebachiana
Calycogonium squamulosum
Heterotrichum cymosum
Micropholis chrysophylloides

In the upper Luquillo Mountains the forest i similar to that of the Cordillera, but there ar in addition a number of species found only o the Luquillo Mountains. The common tree spe cies of the upper Luquillo Forest include th following:

Cyathea arborea
Prestoea montana
Magnolia splendens
Ocotea spathulata
Alchornea latifolia
Croton poecilanthus
Cyrilla racemiflora
Matayba domingensis
Clusia grisebachiana
Calyptranthes krugii
Eugenia borinquensis
Calycogonium squamulosum
Heterotrichum cymosum
Micropholis chrysophylloides
Micropholis garciniifolia
Tabebuia rigida

One of the most prominent species in thes upper mountain forests is the sierra pal (*Prestoea montana*) which forms extensiv nearly pure stands on unstable soils. In th western part of the Cordillera and near I Yunque peak in the Luquillo Mountains grow Puerto Rico's only arborescent gymnospern caobilla (*Podocarpus coriaceus*).

On Puerto Rico's mountain peaks, abo 2,500 feet elevation, the forest is dwarfed to 2 feet or less in height. Little or no valuable tim ber is present in this forest, but tree species c interest include *Weinmannia pinnata* and *Br nellia comocladifolia.*

THE FORESTS OF TODAY

The following description of today's forests has been revised from the first volume (*52*). Two trends in land use, since 1964, seem worthy of mention. The first is the continuing migration of the rural population away from the lands which need the protection of tree growth. This movement, most pronounced in Puerto Rico, has given rise to the natural reforestation of probably tens of thousands of acres formerly cultivated or pastured, in interior Puerto Rico, and also extensive areas in St. Croix. The other change, in part a direct result of the first, is the increasingly urban ownership of the rural lands. This trend has led to more residential development in formerly rural areas near the cities which now have become suburban, together with the decline of farming and the construction of roads and other facilities. The net effects of this trend on the tree-covered area of these islands remain to be seen, but it may well lead to more, rather than less cover, since the viewpoint of urban or primarily residential owners is more favorable to natural vegetation than that of farmers concerned with making the soil produce crops.

Within the total area of Puerto Rico and the Virgin Islands, approximately 2,335,000 acres, there are about 945,000 acres covered by trees.[3] Of this, about 765,000 acres are covered by forests. This is a spectacular increase of more than 100 percent since the publication of the first volume, most of it apparently in the last five years. Part of this difference undoubtedly is due to improved estimates, but much of it can be explained only by the widespread, and everywhere evident reversion of abandoned farmlands to brush and forest. An additional 180,000 acres in Puerto Rico is covered by coffee shade forests, with much of it now abandoned as far as coffee production is concerned.

It is thus seen that somewhat more than half of the land surface of Puerto Rico and the Virgin Islands is not in forests. Far more than this has been deforested at one time or another in the past. Less than one percent of the vegetative cover of the islands (probably all of it in Puerto Rico) is in virgin, unmodified condition.

The cutting of the forests, done partly to harvest their timber but more generally to clear land for farming, took place primarily in the 19th century. It eliminated tree growth from the more fertile and accessible lands. The remaining trees are located chiefly on steep slopes, rocky mountain summits, or where excessive shallowness, dryness, or wetness of the soil precludes economic farming. Thus the best developed forests have disappeared. Most of the forests remaining are those which reappeared after farming was abandoned on these poor lands.

The remaining forests are nearly all very different from those found by the early voyageurs. The most valuable trees, both as to species and as to size, have been removed. Few trees exceed 12 inches in diameter. Most of these are of species unused for purposes other than fuel, and thus of negligible value. These larger trees of inferior quality tend to suppress the development of any younger trees of more valuable species which may be growing beneath them.

A number of the introduced exotic tree species have become naturalized in the forests of the islands, now appearing as though native. Common naturalized species in the humid forests of Puerto Rico include pomarrosa (*Eugenia jambos*), guayaba (*Psidium guajava*), albizia (*Albizia procera*), emajagua (*Hibiscus tiliaceus*), almendra (*Terminalia catappa*), bucayo gigante (*Erythrina poeppigiana*), and tulipán africano (*Spathodea campanulata*). On the dry southwestern coast of Puerto Rico bayahonda (*Prosopis juliflora*) has become naturalized in pastures. In the United States Virgin Islands an outstanding naturalized tree in the forests (particularly in St. Croix) is Dominican mahogany (*Swietenia mahagoni*) and in pastures, tibet (*Albizia lebbeck*).

PUBLIC FORESTS AND PARKS

The system of public forests in Puerto Rico is one of the Commonwealth's most important natural resources. With a total of 15 units, including some 88,000 acres, these forests are not only diverse but well distributed over the island (fig. 4).

Set aside primarily to protect soil and water values, these forest areas range from the largest mangroves along the seacoast to the highest peaks of the Central Cordillera and the Luquillo Mountains. They include the island's driest areas and its wettest.

Ecologically the public forests are an unequaled asset. They contain nearly all of the remaining virgin forest on the island. They include representative areas of the major natural ecosystems. They contain, with few exceptions, all of the island's endemic tree and plant species in sufficient numbers to assure their survival despite continuing destruction of other forest areas. For most of the rare and endangered tree species, and for some of the wildlife as well,

[3] The estimated areas in this chapter are based on a recent inventory of land use made by the Puerto Rico Department of Natural Resources and official reports on agriculture in the United States Virgin Islands. Data on the British Virgin Islands are rough approximations, based upon personal observations in the area.

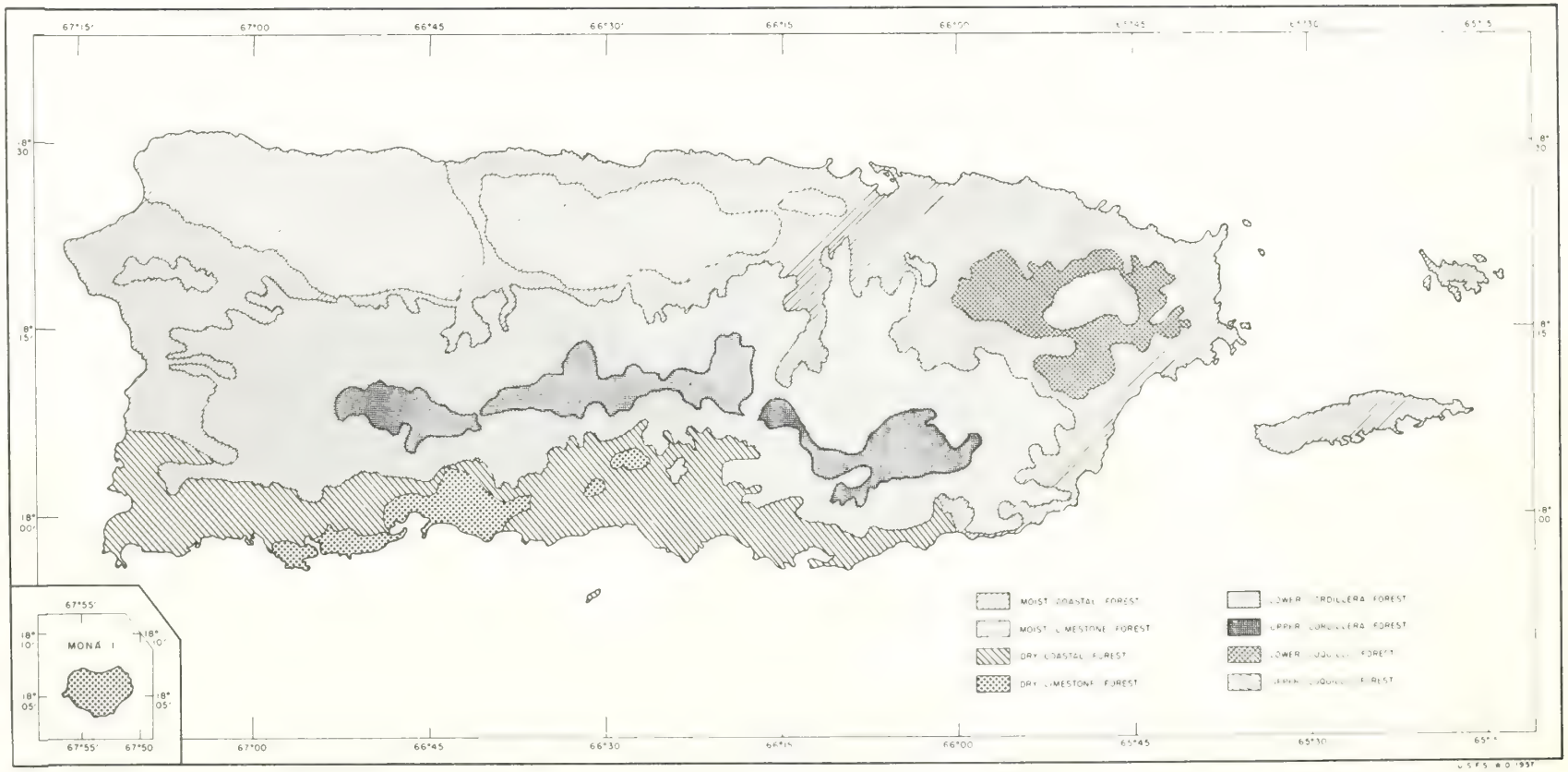

FIGURE 3.—Climax forest types and forest regions of Puerto Rico (same as vol. 1, fig. 2). Not shown are mangrove forests in the 5 public forests bordering the coast (fig. 4).

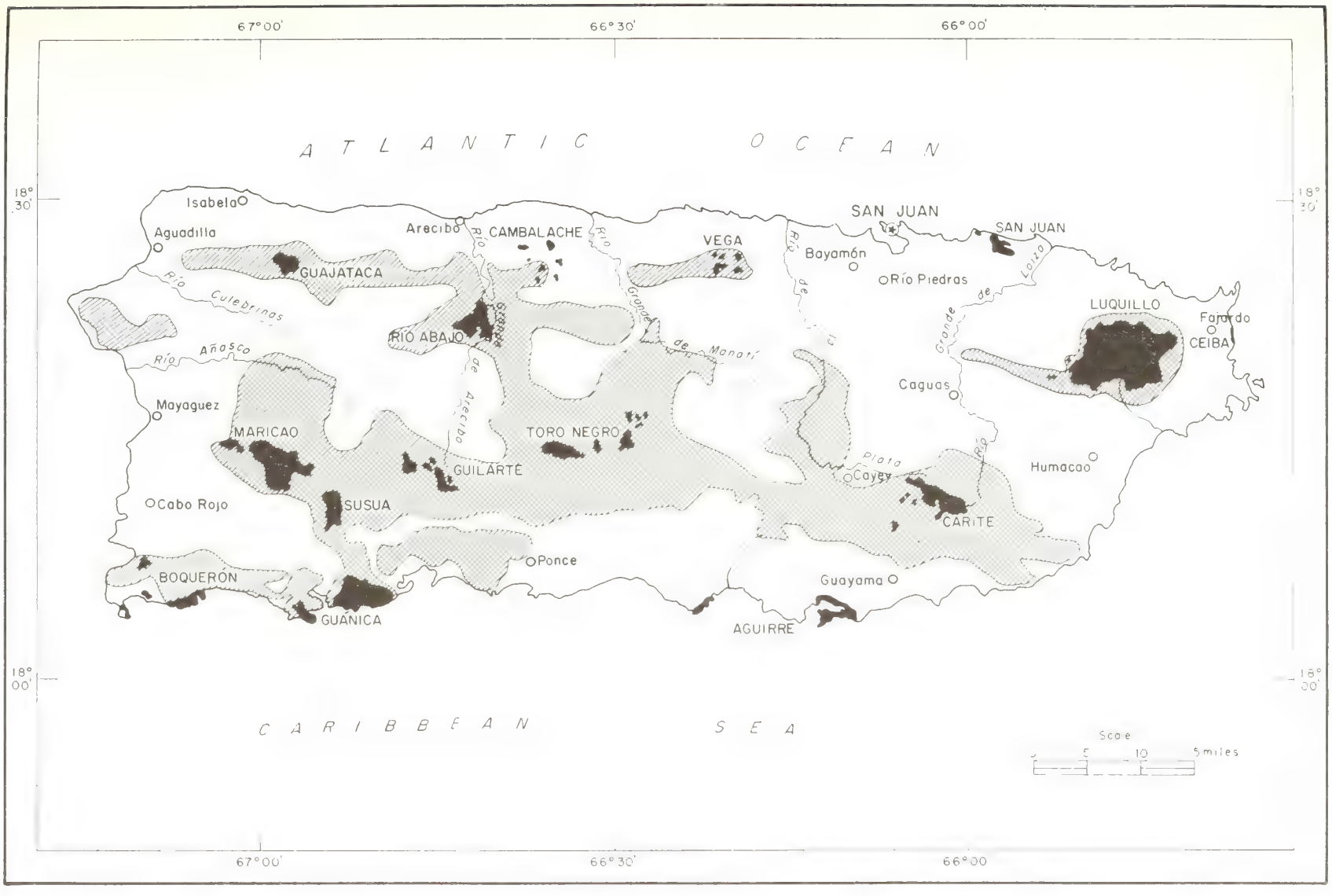

FIGURE 4.—Public forests and forest lands of Puerto Rico (revised and combined from vol. 1, figs. 3 and 4). The public forests (solid black) are 14 Commonwealth Forests (Bosques Estatales) and the Caribbean National Forest or Luquillo Experimental Forest (Federal). Forest lands (shaded) are now more extensive than when mapped earlier (*41*, p. 115). Mona Island (fig. 2) west of Puerto Rico is owned by the Commonwealth and classed under forest lands also.

these forests are currently their only protected habitat, and therefore their best base for survival. In addition, they contain a large number of planted trees in timber plantations. And they are protected, available for study. The public forests in which each tree species is found are indicated in the text.

The public forests are open and are being developed for recreational enjoyment as well as scientific use, to the extent that this does not jeopardize the protection of the resources. Some of the forests already have developed areas and facilities for picnicking, hiking, and other types of recreation. At least one of these forests is within a brief ride over a paved road from any point on the island.

The Caribbean National Forest (Luquillo Experimental Forest) is administered by the Institute of Tropical Forestry of the Forest Service, U. S. Department of Agriculture, with headquarters in Rio Piedras. The other public forests are all administered by the Puerto Rico Department of Natural Resources.

One public forest area, the Estate Thomas Experimental Forest, exists on St. Croix, U. S. Virgin Islands (fig. 1). It contains 149 acres, mostly covered with natural mahogany forest, and is a base for the research program of the Institute of Tropical Forestry. Although small, it also has an area open to public enjoyment.

The Virgin Islands have four national parks containing unusual forest vegetation and numerous tree species not subject to long-range protection elsewhere (fig. 2). These protected lands of mostly dry or seasonal forests are open to the public and accessible. The tree species known to grow within each area are noted in the text.

The National Park Service, United States Department of the Interior, administers two of these public parks. Buck Island Reef National Monument was established in 1961 primarily as an underwater park to preserve the beautiful barrier reefs of coral around most of the shore. This uninhabited island a mile long, containing 176 acres of protected forest vegetation, is located less than 2 miles north of the eastern part of St. Croix.

Virgin Islands National Park, established in 1956 and also under the National Park Service, occupies nearly two-thirds of the island of St. John, a gross area of 14,418 acres. With mountains up to 1,277 feet altitude, it has large areas of several forest types and examples of nearly all tree species native on the island.

Two national parks in the British Virgin Islands are administered by the National Parks Trust. On the island of Tortola is Sage Mountain National Park, about 50 acres in size. Sage Mountain, the highest peak in the Virgin Islands, has an altitude of 1,780 feet and supports a unique mountain forest. Gorda Peak National Park contains undisturbed forest lands on the highest point of Virgin Gorda, altitude 1,371 feet.

FOREST CONSERVATION

The trees and forests of Puerto Rico and the Virgin Islands are a valuable asset. The ornamental value of trees around homes along the roadsides and in parks is apparent to all. Tree fruits provide valuable foods and important items of commerce. Forested areas in the mountains or along beaches offer peaceful shady environment for outdoor recreation and on each of the islands constitute important tourist attractions.

Not so apparent any more are the forests as a source of timber. The best trees of the original forests have been cut long since. Wood is no longer the dominant housing material, or is it even so commonly used on farms. Local fuelwood and charcoal are no longer commonly used. The most persistent local forest product is the fence post, of which more than 10 million are used annually.

The least obvious of the values of our forests is as important as any other, their capacity to conserve soil and water resources. This protective benefit from forest is unexcelled by any other crop. The forest litter reduces surface runoff and erosion. The porous soil beneath forests retains its maximum capacity to absorb rain water—water which may then appear gradually through clear springs rather than in the form of muddy torrents.

The importance of the trees and forests of Puerto Rico and the Virgin Islands is not so much a matter of their present contribution as it is a question of what they might contribute. Past cutting of trees and land clearing have reduced these resources to a fraction of their potential. In recognition of the possibility of enhancing local forest resources, several conservation measures have been taken. A brief history of this activity, confined largely to Puerto Rico, is presented here.

There is little record of actual accomplishments in forest conservation in Puerto Rico prior to 1900. Sixteenth century Spanish laws reflecting the scarcity of forests in Spain, were generally unrealistic for the completely forested island of Puerto Rico. Clearing of forests for farming was then needed, rather than preservation of the forests.

Possibly the first indication of official interest in forest conservation within Puerto Rico was a government circular of 1824 recommending that strips of trees be left along and at the source of streams (*71*). The first appropriation of public funds for forestry in Puerto Rico is recorded for 1860 (*70*). Public forest reserves

were established in 1876 (*14*), and a forest department existed in the colonial government during the rest of the century. The extent and condition of the island's forest resources, as described at the end of that period, testify that conservation efforts to that time were not very effective.

The first step toward forest conservation in Puerto Rico during the present century was the proclamation of the Luquillo Forest Reserve in 1903. This area was surveyed in 1916 and proved to contain about 12,400 acres. The United States Forest Service appointed a supervisor to administer this forest in 1917. In the same year the Puerto Rico Forest Service was established and by 1920 was responsible for the protection of more than 26,000 acres of unalienated forest lands in the mangroves, at Guánica and Maricao, and on Mona Island.

Forestry activities were materially expanded with the advent of the Civilian Conservation Corps in 1935. Since that time the area of Federal forest lands has increased to about 28,000 acres in the Caribbean National Forest (Luquillo Experimental Forest). The Commonwealth now administers about another 64,000 acres in Commonwealth Forests (Bosques Estatales).

The public forests of Puerto Rico were set aside to serve a number of purposes: to protect the soil on steep rainy mountain slopes and elsewhere as needed, such as in the mangroves, to conserve water in the headwaters of watersheds in which the minimization of flooding is critical, to protect forms of native wildlife which require extensive forest habitat as a refuge, to provide areas for the outdoor recreation and education of the community, and to demonstrate the production of needed timber crops where this is compatible with the conservation of the other forest values mentioned.

To achieve these objectives the public forests of Puerto Rico have been manned with protective and managerial personnel. Boundaries have been identified and monumented. Road and trail systems and ranger stations have been built. Some 22,000 acres within these lands have been reforested. About 8,500 acres of natural forest and plantations have been treated silviculturally to thin out undesirable trees or to harvest those mature. The yield to date has been more than 2,500,000 cubic feet of timber. Eleven recreation areas have been built for the use of the public. These improvements represent a total investment of about $20,000,000.

The progress of forest conservation in Puerto Rico depends more on what happens outside the public forests than what is done within them. In effect they are merely publicly set examples intended to lead other owners of other lands to good practices. The critical condition of these lands is apparent when it is recognized that the public lands barely make up 10 percent of the more than 850,000 acres of lands which, because of climate, slope, or soil are best suited for a permanent forest cover. The location of the main concentrations of the lands which should remain forested is indicated in Figure 4 (shaded). Almost none of these lands are subject to forest management; more than half of them are not even forested. The areas are now more extensive than when mapped earlier (vol. 1, fig. 4, from Koenig (*41*, p. 115)).

The Federal and Commonwealth governments work together to foster proper conservation of all of these lands which should be kept forested. The Department of Natural Resources provides planting stock and technical assistance to landowners. The Agricultural Extension Service, the Soil Conservation Districts, and the Soil Conservation Service also participate. The Forest Service conducts needed research and provides the results for direct use. This research program includes the search for better tree species and their productivity potential, improved techniques for tree propagation, planting, weeding, and plantation management and utilization of forest products.

In the Virgin Islands a few old laws exist regarding the protection of trees along streams, but in the course of time these islands, both the British and United States, became almost completely deforested to the tops of the mountains. However, in the United States islands extensive secondary forests have developed with the decline in population and agriculture which took place in the past 60 years.

Possibly the outstanding early development which is of significance to forestry was the introduction of Dominican mahogany (*Swietenia mahagoni*) into St. Thomas and St. Croix. This introduction, judging by the size of some of the older trees on St. Croix, must have been made at least 200 years ago. In all probability, some of these initial introductions now stand along Mahogany Road. A planting in the hills southwest of Christiansted, St. Croix (probably as shade trees in the estate yard at Bellevue), has given rise to natural regeneration of mahogany covering some 300 adjacent acres—most of it in sugar cane until 1928. Isolated pockets on St. Croix bring the total acreage of natural mahogany on this island to about 400.

A limited government program of tree planting was carried out in St. Thomas in the early 1930's, administered from Puerto Rico. Undoubtedly some of the younger mahoganies on that island are a result. Nevertheless, this species is relatively unknown in St. John and Tortola.

Since 1956, the U. S. Government has supported a full-time forestry program in the U. S. Virgin Islands, initially through the Virgin

Islands Corporation and subsequently through the Forest Service, recently in cooperation with the Territorial Department of Agriculture. About 250,000 mahogany and teak seedlings have been propagated on St. Croix during these 16 years, and planted on nearly 100 rough, mostly steep slopes on both private and public lands. In addition, many thousands of mahogany and other seedlings have been made available to the public as ornamentals. A 1967 Conservation Needs Inventory shows 20,000 acres of the Virgin Islands as suitable for forestry. Twenty-nine active studies place special emphasis on the establishment, growth rate, quality, and disease resistance of mahogany. Hybrids of Honduras (*Swietenia macrophylla*) and West Indies mahogany (*S. mahagoni*) are being identified for their superior growth rate and desirability for specialty wood products.

Estate Thomas Experimental Forest was established in St. Croix in 1963 and in addition, Federally owned lands at Ham Bluff and Sion Ridge are available for demonstration and research. Four thousand roadside trees planted within the last 15 years are given some protection and maintenance—in addition to the older trees established under the Danish regime, and later under the U. S. Civilian Conservation Corps in the 1930's. Encouragement is given plantations on private lands through a special tax rebate program which allows tax advantages to landowners who manage their plantations.

The establishment of Virgin Islands National Park in 1956 was an important step in forest conservation. Occupying nearly two-thirds of St. John, this park assures the continued preservation of forests and other natural vegetation and wildlife on one island. Besides providing recreation, watershed protection, wildlife habitats, and other values, these forested areas preserve rare species from extinction and are available for comparison with managed forests and nonforested lands, also for education and research.

The report on forestry in the British Virgin Islands by Beard (*7*) in 1945 contains a description of the forests, recommendations for the forest policy, and a land utilization map. These islands, totaling 67 square miles in area, have a relatively low rainfall and vegetation mostly of dry or deciduous seasonal forest and thorn bush and scrub. However, Sage Mountain on Tortola has higher precipitation and mountain or rain forest of larger trees, partly cut. Additional descriptions of the forests and other vegetation with plant lists have been made for the islands of Tortola and Anegada by D'Arcy (*17*, *18*).

The two national parks in the British Virgin Islands, Sage Mountain near the summit of Tortola and Gorda Peak on the highest part of Virgin Gorda, are important in forest conservation. These areas have many beneficial values of forest preserves, such as watershed protection, and could be developed also for recreation. Plantations of mahogany have been made on Sage Mountain by the Agriculture Department

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SPECIAL LISTS

Tree species of Puerto Rico and the Virgin Islands with some distinctive character, special feature, or use in common have been grouped together in various lists. These lists may be helpful in identification, in locating trees with useful products, and in selecting species for planting.

Special Lists for the common trees were published in the first volume (pages 19–20). Similar lists for the trees of the second volume are listed below. The less common native trees and the many small trees may have fewer uses, particularly for wood products. However, some would make attractive ornamentals. Introduced trees have their special uses.

The tree species are cited by their numbers to save space. Common and scientific names may be found under "List of Tree Species" (pages iv–xiv).

POISONOUS TREES

POISONOUS TREES WITH TOXIC FRUITS, SEEDS, OR LEAVES.—257, 431, 444, 448, 480, 665, 668.

POISONOUS TREES WITH IRRITATING SAP.—440–443 (*Euphorbia*), 449–450 (*Sapium*), 455–456 (*Comocladia*).

POISONOUS TREES WITH IRRITATING HAIRS.—299–301 (nettle family), 421, 423–427 (*Malpighia*), 433, 506.

APPEARANCE AND TRUNK

GIANT TREES.—(reaching 100 feet in height or 4 feet in trunk diameter).—363, 388, 499, 500.

LARGE BUTTRESSES.—295, 388, 481, 494, 506, 587, 640, 645, 648.

PROP ROOTS (stilt roots).—264, 288–291 (*Ficus*), 518.

UNBRANCHED STEM.—251–256 (tree-fern family), 257, 265–272 (palm family), 273–275 (lily family), 276, 447, 456.

HORIZONTAL BRANCHING.—259, 260, 355, 385, 493, 528.

SPINY TRUNK OR BRANCHES.—251, 255, 287, 299–301 (nettle family), 307, 355, 359, 365, 369, 376, 378–381 (*Erythrina*), 385, 395, 396, 403–407 (*Zanthoxylum*), 408, 429, 441, 442, 452, 490, 491, 500, 501, 525, 526, 534, 535, 537–539 (cactus family), 542, 544, 545, 636, 676, 681, 684, 698, 699, 705, 733.

PEELING, SMOOTH, MOTTLED BARK.—583, 586, 588, 590.

COLORED SAP OR LATEX

WHITE OR MILKY SAP OR LATEX.—287–29[illegible] (mulberry family), 432, 440–443 (*Euphorbia*), 449, 450, 455, 456, 636–647 (sapodilla family), 664–668 (dogbane family), 669.

YELLOW OR ORANGE SAP OR LATEX.—342, 434, 435, 517–520 (mangosteen family).

REDDISH SAP OR LATEX.—388.

LEAVES

VERY LARGE LEAVES (more than 1 foot long, including compound leaves).—251–256 (tree-fern family), 257, 264, 265–272 (palm family), 273–275 (lily family), 276, 290, 291, 312, 32[illegible], 342, 388, 415, 448, 456, 546, 601, 623, 647.

SPINY LEAVES.—251, 252, 255, 274, 416, 43[illegible], 455, 488, 508, 698, 699, 729.

LEAVES REDUCED TO SCALES OR NONE.—261, 263 (cypress family), 277, 278, 441–443 (*Euphorbia*), 521, 537–539 (cactus family).

FRAGRANT OR AROMATIC LEAVES (with odor when crushed).—279, 280, 283, 284, 325–34[illegible] (laurel family), 353, 396, 397, 398, 399, 40[illegible], 549, 551, 556, 559, 560, 563, 565, 580, 581, 58[illegible], 587, 588, 590.

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ORANGE SHOWY FLOWERS.—674, 675.

PINK SHOWY FLOWERS.—371, 501, 505, 54[illegible], 665, 708.

RED SHOWY FLOWERS.—369, 378, 379, 38[illegible], 381, 446, 496, 497, 543, 545, 547, 551, 623, 66[illegible], 731.

BLUE OR PURPLE SHOWY FLOWERS.—366, 36[illegible], 389, 622, 684, 685.

VERY FRAGRANT FLOWERS.—395, 396, 39[illegible], 399, 508, 509, 544, 659, 666, 667, 680, 713.

UNPLEASANT ODORS (foliage, flowers, fruits)—320, 506, 547, 561, 572, 573, 743.

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VERY LARGE FRUITS (more than 6 inches long and 4 inches broad or more than 1 foot long).—264, 366, 367, 371, 374, 395, 396, 499, 502, 547, 647, 700, 704, 706.

FRUIT A BEANLIKE POD.—343–347 (*Capparis*), 354–389 (legume family), 664–666 (dogbane family), 700, 704, 706–709 (bignonia family).

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MEDICINAL TREES (U. S. Pharmacopoeia or Dispensatory).—326, 387, 444, 448, 503, 530, 749.

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TREES FOR FOREST PLANTATIONS.—258, 260, 261, 353, 376, 377, 415, 496, 559, 560, 656, 700, 712.

TREES FOR WINDBREAKS.—277, 278.

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ORNAMENTAL TREES ALSO PRODUCING EFFECTIVE SHADE.—260, 364, 377, 388, 414, 431, 517, 546.

ORNAMENTAL TREES ALSO PRODUCING EDIBLE FRUITS.—296, 349, 350, 363, 390, 490, 493, 506, 537, 545, 580, 748.

ORNAMENTAL TREES ALSO PRODUCING VALUABLE TIMBER.—260, 377, 388, 496, 708, 718.

KEY TO FAMILIES

When the plant family of a tree is not known, this key to the families of the trees of Puerto Rico and the Virgin Islands aids identification. Ninety-nine plant families are included, all 85 with native plants and also 14 others with common introduced trees.

This key is slightly revised and enlarged from that of the first volume (p. 21–27), which contained 87 families. The 12 additions, mostly representing introduced or shrubby trees are: Cycadaceae, Araucariaceae,* Cupressaceae,* Pandanaceae,* Liliaceae, Musaceae, Myricaceae, Papaveraceae, Oxalidaceae, Buxaceae, Asclepiadaceae, Gesneriaceae. Also, the family Podocarpaceae has been separated from Taxaceae.

Keys to species are included in both volumes. The first volume has keys to the 250 species illustrated. All 35 families with 2 or more species illustrated have keys to those species.

This second volume has keys to all 750 species of both. However, no further keys are needed for the 29 families represented by a single species, 13 in the first volume and 16 others in the second. The key to species covering both volumes follows the paragraph of family description. For the 250 species of the first volume the names of authors, also the preferred Spanish and English common names, have been added.

Several genera have been included in the key to families also. If a plant family has only 1 or 2 genera of native trees, these generic names are cited after the family name. Also, several genera differing slightly from the main characters of their families have been inserted separately. However, this artificial key may not provide for a few odd genera and extreme variations. Introduced or exotic genera and families are indicated by an asterisk (*).

Keys are outlines or shortcuts for identifying trees or specimens by the process of elimination. Thus, trees are divided into two groups according to one or more pairs of contrasting characters. Each group is divided successively into two smaller groups until the name is reached. The name of a particular specimen is found through selection, one by one, of the group which fits and by elimination of the others.

In these indented keys, paired groups are designated by the same letter, single and double, beginning with "A" and "AA" at the left of the page and are equally indented by steps. The page number refers to the descriptive text, the beginning of the family in volume 2 or th genus listed.

An unpublished card key to families of Wes Indian trees by the first author has served a the basis for this one. Nontechnical character and those readily observed have been empha sized. The descriptive terms are defined unde the topic "Explanation of Botanical Terms (p. 12).

One character used in the key, presence o absence of stipules (one or two scales at th base of a leaf), may be difficult to determine be cause the stipules sometimes are minute or she early. Stipules can be examined best in the bu and immature leaves near the stem tip. Upo shedding, the stipules leave a scar, which als may be minute.

Vegetative characters, especially those o leaves, are placed first in the key. Some plan families of trees can be recognized or identifie by certain combinations of vegetative chara ters alone. However, many kinds of tropic trees have foliage of similar appearance.

For positive identification of many familie the reproductive characters of flowers, fruit and seeds are needed. Even when these a lacking, old fruits may be located on dea branches or on the ground, and one tree may l found flowering out of season. Some steri specimens, those lacking flowers or fruits, ca be identified to family by the vegetative cha acters beginning the key. If not, the key w eliminate many families. Then identificati can be continued by consulting the descriptio and drawings for the remaining families.

The key to families is divided into four par according to the arrangement or position of t leaves and the number of blades. Parts 1 and are for trees with alternate leaves, that is, a tached singly or 1 at a point on a twig (node Parts 3 and 4 are for trees with opposite leav that is, paired or 2 at a node, and also tho with whorled leaves, 3 or more at a node. Par 1 and 3 are for trees with simple leaves, with blade, and Parts 2 and 4, trees with compou leaves, divided into 3 or more blades (rare only 2).

The first step in using this key to families to place the unknown tree or specimen in one the four groups listed below. Then continue t key under the part or group on the page cit

Part 1. Leaves alternate, simple (p. 35).
Part 2. Leaves alternate, compound (p. 39)
Part 3. Leaves opposite, simple (p. 40).
Part 4. Leaves opposite, compound (p. 41).

PART 1. LEAVES ALTERNATE, SIMPLE

A. Seeds exposed or naked; flowers and fruits not produced; leaves needlelike, scalelike, lance-shaped, or narrowly ovate, thickened, without visible lateral veins (gymnosperms, conifers).
  B. Leaves lance-shaped, with midvein; seed exposed on 2-lobed red fleshy base—Podocarp Family (Podocarpaceae; *Podocarpus;* formerly under Yew Family, Taxaceae), vol. 2, p. 54.
  BB. Leaves narrowly ovate, needlelike, or scalelike, without midvein; seeds often winged, borne above scales of a hard woody cone—Araucaria Family (Araucariaceae;* *Agathis,** *Araucaria**), vol. 2, p. 54.
AA. Seeds enclosed in fruits maturing from flowers; leaves various (angiosperms or flowering plants).
  C. Leaves parallel-veined; trunk unbranched or with few stout branches (very slender branches in bamboo), not increasing in diameter (monocotyledons).
    D. Leaves with very long petiole and with large blade more than 1 foot wide.
      E. Leaves palmlike, fan-shaped, spreading around apex of trunk—Palm Family (Palmae), vol. 2, p. 68.
      EE. Leaves bananalike, narrowly oblong, in 2 vertical rows along trunk—Banana Family (Musaceae; *Ravenala**), vol. 2, p. 86.
    DD. Leaves mostly without petiole and with narrow blade less 6 inches wide.
      F. Leaves borne singly, grasslike, divided into sheath and blade; bamboo—Grass Family (Gramineae; *Bambusa**), vol. 2, p. 66.
      FF. Leaves crowded, not divided into sheath and blade.
        G. Leaves arranged in a spiral; trunks spreading, supported by prop roots—Screw-pine Family (Pandanaceae,* *Pandanus**), vol. 2, p. 66.
        GG. Leaves spreading in all directions; trunks erect, without prop roots—Lily Family (Liliaceae; *Dracaena,** *Yucca**), vol. 2, p. 80.
  CC. Leaves with veins forming network or inconspicuous, sometimes reduced to scales or none; trunk becoming branched, increasing in diameter (dicotyledons).
    H. Leaves reduced to scales or none.
      I. Stems succulent, mostly spiny.
        J. Sap whitish or milky—*Euphorbia*, vol. 1, p. 270; vol. 2, p. 408.
        JJ. Sap watery—Cactus Family (Cactaceae), vol 2, p. 598.
      II. Stems wirelike, not spiny, with minute scale leaves 1 at a node—Tamarisk Family (Tamaricaceae;* *Tamarix**), vol. 2, p. 568.
    HH. Leaves larger, with flat green blade.
      K. Sap or latex colored.
        L. Sap whitish or milky (sometimes darkening upon exposure).
          M. Stipules present (sometimes minute or falling early, leaving a scar); flowers unisexual.
            N. Stipule large, 1 at node, forming long-pointed bud; leaf blade without gland at base; nodes mostly with rings; female flowers with 2 or 1 style—Mulberry Family (Moraceae), vol. 2, p. 106.
            NN. Stipules mostly small, 2 at node, not forming bud; leaf blades often with 2 or 1 gland at base; nodes without rings; female flowers with 3 styles—Spurge Family (Euphorbiaceae), vol. 2, p. 384.
          MM. Stipules none.
            O. Leaves palmately lobed; flowers mostly unisexual—Papaya Family (Caricaceae;* *Carica**), vol. 2, p. 598.
            OO. Leaves not lobed; flowers mostly bisexual.
              P. Corolla of 3–5 separate petals—Cashew Family (Anacardiaceae), vol. 2, p. 436.
              PP. Corolla tubular, of united petals.
                Q. Stamens opposite corolla lobes; fruit a berry, borne singly—Sapodilla Family (Sapotaceae), vol. 2, p. 774.
                QQ. Stamens alternate with corolla lobes; fruits (drupes or follicles) usually paired, 2 from a flower—Dogbane Family (Apocynaceae), vol. 2, p. 826.
        LL. Sap not whitish.
          R. Sap orange.
            S. Leaves with midvein and many toothed lateral lobes—Poppy Family (Papaveraceae; *Bocconia*), vol. 2, p. 216.
            SS. Leaves palmate-veined, not lobed or toothed—Anatto Family (Bixaceae;* *Bixa**), vol. 2, p. 568.
          RR. Sap reddish—*Coccoloba uvifera*, vol. 1, p. 82.
      KK. Sap watery.
        T. Nodes with rings.
          U. Stipules present.
            V. Stipules forming sheath around twig—Buckwheat Family (Polygonaceae), vol. 2, p. 148.
            VV. Stipules enclosing bud, soon shedding.
              W. Leaves pinnate-veined, elliptic—Magnolia Family (Magnoliaceae; *Magnolia*), vol. 2, p. 168.
              WW. Leaves palmate-veined, with 7–11 main veins from base, nearly round.
                X. Leaves heart-shaped, not lobed—Mallow Family (Malvaceae; *Hibiscus*), vol. 2, p. 516.

XX. Leaves very large, umbrellalike, with 7–11 rounded lobes—*Cecropia*, vol. 1, p. 66.

UU. Stipules none—Pepper Family (Piperaceae; *Piper*), vol. 2, p. 90.

TT. Nodes without rings.

Y. Leaves in 2 rows along twig.

Z. Leaves with swelling where petiole joins blade—Elaeocarpus Family (Elaeocarpaceae; *Sloanea*), vol. 2, p. 512.

ZZ. Leaves without swelling on petiole.

a. Stipules none; flowers with many pistils often uniting to form 1 large many-seeded fruit—Annona Family (Annonaceae), vol. 2, p. 170.

aa. Stipules present (sometimes minute or shedding early, leaving scar); flowers with 1 pistil.

b. Flowers unisexual or mostly so, petals none.

c. Leaves asymmetrical; styles 2; fruit 1-seeded—Elm Family (Ulmaceae; *Celtis, Trema*), vol. 2, p. 104.

cc. Leaves symmetrical; styles 3; fruit a few-seeded capsule—Spurge Family (Euphorbiaceae), vol 2, p. 384.

bb. Flowers bisexual; petals usually present.

d. Petals 5, hood-shaped (sometimes none); stamens 5, opposite petals and often within; fruit with 1–4 seeds—Buckthorn Family (Rhamnaceae), vol. 2, p. 498.

dd. Petals 3–7, broad (sometimes none); stamens 5 to many; fruit with few to many seeds.

e. Stamens 5–15, united toward base or borne on stalk—Chocolate Family (Sterculiaceae), vol. 2, p. 532.

ee. Stamens many, mostly separate.

f. Leaves symmetrical, with 1 midvein from base—Flacourtia Family (Flacourtiaceae), vol. 2, p. 570.

ff. Leaves asymmetrical, with 3 main veins from very oblique base —*Muntingia*,* vol. 2, p. 512.

YY. Leaves in more than 2 rows along twig.

g. Leaves with minute gland dots (seen with lens).

h. Leaves not aromatic.

i. Gland dots both large and small—Myoporum Family (Myoporaceae; * *Bontia* *), vol. 2, p. 910.

ii. Gland dots uniformly small—Myrsine Family (Myrsinaceae), vol. 2, p. 766.

hh. Leaves aromatic, with distinctive odor when crushed.

j. Gland dots orange or yellow, on surface; leaves small, toothed on edges—Waxmyrtle Family (Myricaceae; *Myrica*), vol. 2, p. 98.

jj. Gland dots not orange or yellow, beneath surface; leaves various.

k. Flowers with numerous separate stamens—Myrtle Family (Myrtaceae), vol. 2, p. 622.

kk. Flowers with 12 or fewer stamens or if many, united in tube.

l. Stamens with anthers opening by pores with lids; leaves mostly elliptic with side veins long and curved; odor and taste of spices Laurel Family (Lauraceae), vol. 2, p. 182.

ll. Stamens with anthers splitting open lengthwise.

m. Leaves with odor and taste of citrus; stamens large, separate —Rue Family (Rutaceae), vol. 2, p. 320.

mm. Leaves with peppery, stinging taste; stamens minute, united into a tube—Canella Family (Canellaceae; *Canella, Pleodendron*), vol. 2, p. 570.

gg. Leaves without minute gland dots.

n. Stipules present (sometimes minute or shedding early, leaving scar).

o. Stipule a pointed scale above petiole, persistent—Coca Family (Erythroxylaceae; *Erythroxylum*), vol. 2, p. 314.

oo. Stipules outside petiole.

p. Leaves lobed.

q. Leaves with 2 rounded lobes at apex and 13 or 11 veins from heart-shaped base—*Bauhinia*, vol. 1, p. 168; vol. 2, p. 266.

qq. Leaves deeply palmately lobed with mostly 5 long-pointed, finely toothed lobes—Cochlospermum Family (Coclospermaceae; * *Cochlospermum* *), vol. 2, p. 568.

pp. Leaves not lobed.

r. Leaves long, very narrow, finely toothed—Willow Family (Salicaceae; * *Salix* *), vol. 2, p. 96.

rr. Leaves broad, mostly not toothed.

s. Flowers minute.

t. Flowers unisexual.

u. Leaves with stinging hairs—Nettle Family (Urticaceae; *Urera*), vol. 2, p. 132.

uu. Leaves without stinging hairs.

v. Female flowers usually without petals, with 3 or 2 styles; fruit a drupe or capsule—Spurge Family (Euphorbiaceae), vol. 2, p. 384.

vv. Female flowers with usually 4 petals, 4 stigmas; fruit a berry with 4 nutlets—Holly Family (Aquifoliaceae; *Ilex*), vol. 2, p. 442.

tt. Flowers bisexual.
w. Ovary inferior—Ginseng Family (Araliaceae; *Dendropanax*), vol. 2, p. 752.
ww. Ovary superior—Bittersweet Family (Celastraceae), vol. 2, p. 458.
ss. Flowers larger, often showy.
x. Fruits 2–5 from flower, berrylike, black, borne on an enlarged red disk; flowers yellow—Ochna Family (Ochnaceae; *Ochna,** *Ouratea*), vol. 2, p. 540.
xx. Fruit 1 from a flower.
y. Leaves pinnate-veined; flowers with cuplike base bearing sepals, 5 petals, and mostly many separate stamens—Rose Family (Rosaceae), vol. 2, p. 230.
yy. Leaves palmate-veined (pinnate-veined in *Quararibea*, vol. 1, p. 336), flowers with parts inserted at base, stamens many, united into a column around pistil.
z. Flowers with unbranched style—Bombax Family (Bombacaceae), vol. 2, p. 524.
zz. Flowers with style having mostly 5 branches—Mallow Family (Malvaceae), vol. 2, p 516.
nn. Stipules none.
A. Ovary inferior.
B. Leaves palmate-veined, petiole joining blade usually above base—Hernandia Family (Hernandiaceae; *Hernandia*), vol. 2, p. 214.
BB. Leaves pinnate-veined.
C. Corolla none or minute—Combretum Family (Combretaceae), vol. 2, p. 622.
CC. Corolla present.
D. Flowers and fruits small, less than 1¼ inches long and wide.
E. Flowers nearly stalkless at leaf bases; fruit a 1-seeded drupe—Sweetleaf Family (Symplocaceae; *Symplocos*), vol. 2, p. 800.
EE. Flowers at end of very long slender stalk; fruit a many-seeded capsule—Gesneria Family (Gesneriaceae; *Gesneria*), vol. 2, p. 908.
DD. Flowers and fruits large, more than 2 inches long or wide—Lecythis Family (Lecythidaceae; * *Barringtonia,** *Couroupita* *), vol. 2, p. 616.
AA. Ovary superior.
F. Corolla of separate petals or absent.
G. Flowers unisexual.
H. Calyx a cylindrical tube with 4 lobes; corolla absent—Mezereon Family (Thymeleaceae; *Daphnopsis*), vol. 2, p. 604.
HH. Calyx of mostly separate sepals.
I. Pistils 3, each forming a drupe with 1 curved seed—Moonseed Family (Menispermaceae; *Hyperbaena*), vol. 2, p. 168.
II. Pistil 1.
J. Styles 3 or 2; fruit a capsule or drupe—Spurge Family (Euphorbiaceae), vol. 2, p. 384.
JJ. Style 1, 3-forked; fruit of 3 winged keys—*Thouinia portoricensis*, vol. 1, p. 310.
GG. Flowers bisexual.
K. Pistils (or ovaries) 4 to many.
L. Pistils many, crowded in ring—Dillenia Family (Dilleniaceae, *Dillenia* *), vol. 2, p. 538.
LL. Pistils (or ovaries) 4–5—Ailanthus Family (Simaroubaceae), vol. 2, p. 346.
KK. Pistil 1.
M. Flowers minute.
N. Flowers regular.
O. Flowers in long narrow racemes, white; fruit a minute capsule—Cyrilla Family (Cyrillaceae, *Cyrilla*), vol. 2, p. 440.
OO. Flowers in panicles or single; fruit a drupe—Icacina Family (Icacinaceae; *Mappia, Ottoschulzia*), vol. 2, p. 478.
NN. Flowers irregular, with 5 unequal petals—Sabia Family (Sabiaceae, *Meliosma*), vol. 2, p. 496.
MM. Flowers larger.
P. Flowers regular.

Q. Flowers with 4 petals, 4 to many long stamens; pistil usually stalked, with short style or none—Caper Family (Capparidaceae; *Capparis, Morisonia*), vol. 2, p. 218.

QQ. Flowers with 5 overlapping sepals, 5 petals, many stamens, and pistil with 2–5 styles—Tea Family (Theaceae), vol. 2, p. 548.

PP. Flowers irregular, with usually 3 petals and 8 stamens united into a tube—Milkwort Family (Polygalaceae; *Polygala*), vol. 2, p. 382.

FF. Corolla of united petals.

R. Stamens separate and distinct.

S. Fruit a drupe—Olax Family (Olacaceae; *Schoepfia, Ximenia*), vol. 2, p. 140.

SS. Fruit a capsule—Heath Family (Ericaceae; *Lyonia*), vol. 2, p. 760.

RR. Stamens inserted on corolla.

T. Stamens 2–3 times as many as corolla lobes.

U. Flowers unisexual (dioecious), styles 2–6; fruit fleshy, few-seeded—Ebony Family (Ebenaceae; *Diospyros*), vol. 2, p. 794.

UU. Flowers bisexual, style 1; fruit dry, 1-seeded—Storax Family (Styracaceae; *Styrax*), vol. 2, p. 798.

TT. Stamens as many as corolla lobes or fewer.

V. Flowers regular.

W. Style 1; fruit a berry—Nightshade Family (Solanaceae), vol. 2, p. 866.

WW. Styles 2 or divided into 4 forks; fruit a drupe or 1–4 nutlets—Borage Family (Boraginaceae), vol. 2, p. 838.

VV. Flowers irregular, large, with long corolla tube—*Enallagma*, vol. 2, p. 896.

PART 2. LEAVES ALTERNATE, COMPOUND

A. Trunk unbranched, not increasing in diameter; leaves very large, more than 3 feet long.
  B. Leaves fernlike, bipinnate or tripinnate, coiled at tip when growing, often bearing brown masses of powdery spores beneath; seeds, flowers, and fruits not produced—Tree-fern Family (Cyatheaceae; *Cyathea, Nephelea, Alsophila*), vol. 2, p. 42.
  BB. Leaves palmlike, once pinnate.
    C. Leaflets without lateral veins; seeds exposed or naked; flowers and fruits not produced—Cycad Family (Cycadaceae; *Cycas* *), vol. 2, p. 52.
    CC. Leaflets parallel-veined; seeds enclosed in fruits maturing from flowers—Palm Family (Palmae), vol. 2, p. 68.
AA. Trunk becoming branched, increasing in diameter; leaves less than 2 feet long, leaflets with veins forming network or inconspicuous (dicotyledons).
  D. Leaves pinnate, including bipinnate and tripinnate.
    E. Leaves bipinnate or tripinnate.
      F. Leaflets long-pointed, edges toothed—*Melia azedarach*,* vol. 1, p. 246.
      FF. Leaflets rounded or short-pointed at apex, edges not toothed.
        G. Fruit a pod (legume) with beanlike seeds—Legume Family (Leguminosae), vol. 2, p. 240.
        GG. Fruit a long 3-angled capsule with winged seeds—Horseradish-tree Family (Moringaceae; * *Moringa* *), vol. 2, p. 228.
    EE. Leaves once pinnate.
      H. Leaflets deeply divided into narrow segments, white hairy beneath; leaves fernlike, almost bipinnate—Protea Family (Proteaceae; * *Grevillea* *), vol. 2, p. 138.
      HH. Leaflets not deeply divided or lobed.
        I. Leaflets 5–9, partly whitish green or bordered with white (variegated), with sharp teeth of 2 sizes—*Polyscias*,* vol. 2, p. 758.
        II. Leaflets not partly whitish.
          J. Stipules usually present; fruit a pod (legume) with beanlike seeds—Legume Family (Leguminosae), vol. 2, p. 240.
          JJ. Stipules none; fruits and seeds various.
            K. Sap whitish or milky (sometimes darkening upon exposure) or gray, resinous.
              L. Flowers with 1 very short style, stamens twice as many as petals—Bursera Family (Burseraceae), vol. 2, p. 354.
              LL. Flowers with 3–5 stigmas or styles, stamens as many or twice as many as petals—Cashew Family (Anacardiaceae) vol. 2, p. 436.
            KK. Sap watery.
              M. Leaflets with minute gland dots, with citruslike odor when crushed—Rue Family (Rutaceae), vol. 2, p. 320.
              MM. Leaflets without gland dots.
                N. Leaves with 13–19 lanceolate asymmetrical leaflets, sharply toothed, long-pointed; fruit a walnut—Walnut Family (Juglandaceae, *Juglans*) vol. 2, p. 102.
                NN. Leaves and fruit otherwise.
                O. Flowers with 2–5 pistils or 1 deeply lobed pistil and with 2–5 styles or stigmas.
                P. Fruits sharply 5-angled, yellow, sour (carambola)—Oxalis Family (Oxalidaceae; *Averrhoa* *), vol. 2, p. 312.
                PP. Fruits not angled, mostly red or black, bitter and not edible; bark and sap bitter—Ailanthus Family (Simaroubaceae), vol. 2, p. 346.
                OO. Flowers with 1 pistil and 1 style.
                Q. Flowers mostly unisexual, stamens 5–10, separate—Soapberry Family (Sapindaceae), vol. 2, p. 482.
                QQ. Flowers bisexual, with mostly 8–10 stamens united into a tube (separate in *Cedrela*)—Mahogany Family (Meliaceae), vol. 2, p. 356.
  DD. Leaves digitate (palmate) or with 3 leaflets (trifoliolate).
    R. Leaflets with minute gland dots, with citruslike odor when crushed—Rue Family (Rutaceae), vol. 2, p. 320.
    RR. Leaflets without gland dots.
      S. Leaflets 3.
        T. Stipules usually present; fruit a pod (legume) with beanlike seeds—*Erythrina*, vol. 1, p. 190; vol. 2, p. 292.
        TT. Stipules absent; fruit a drupe or winged key—Soapberry Family (Sapindaceae), vol. 2, p. 482.
      SS. Leaflets 5 or more.
        U. Flowers minute; fruit a small, slightly fleshy berry, 2-seeded—Ginseng Family (Araliaceae), vol. 2, p. 752.
        UU. Flowers large, with 5 whitish or pinkish petals; fruit a large oblong capsule with seeds mostly in woolly hairs—Bombax Family (Bombacaceae), vol. 2, p. 524.

PART 3. LEAVES OPPOSITE, SIMPLE

A. Seeds exposed or naked, borne above scales of a hard woody cone; flowers and fruits not produced; leaves scalelike and 2–3 at a node or needlelike and 2–5 in a bundle, resinous (gymnosperms, conifers).
  B. Leaves scalelike, 2–3 at a node—Cypress Family (Cupressaceae; * *Cupressus,** *Thuja*; * formerly included in Pine Family, Pinaceae *), vol. 2, p. 60.
  BB. Leaves needlelike, long, 2–5 in a bundle—Pine Family (Pinaceae; * *Pinus* *), vol. 2, p. 58.
AA. Seeds enclosed in fruits maturing from flowers; leaves various (angiosperms, flowering plants).
  C. Leaves consisting of 6–12 minute scales in a whorl on wiry green jointed twigs—Casuarina Family (Casuarinaceae;* *Casuarina* *), vol. 2, p. 88.
  CC. Leaves larger, with flat green blade, opposite or sometimes whorled.
    D. Sap or late colored.
      E. Sap whitish or milky.
        F. Leaves 3–8 at a node, with petiole about as long as blade—*Euphorbia,* vol. 1, 270; vol. 2, p. 408.
        FF. Leaves 2–4 at a node, with short petiole.
          G. Leaves broadly elliptic, heart-shaped and nearly stalkless at base—Milkweed Family (Asclepiadaceae; *Calotropis* *), vol. 2, p. 836.
          GG. Leaves narrow, the base narrowed at petiole—Dogbane Family (Apocynaceae), vol. 2, p. 826.
      EE. Sap not whitish.
        H. Sap yellow or orange (whitish in *Calophyllum*)—Mangosteen Family (Guttiferae), vol. 2, p. 560.
        HH. Sap of young leaves reddish—*Tectona,** vol. 1, p. 484.
    DD. Sap watery.
      I. Leaves with border of coarse teeth, often unequal; flowers in a head bordered by many overlapping scales—Composite Family (Compositae; *Clibadium, Eupatorium*), vol. 2, p. 982.
      II. Leaves not toothed or finely toothed; flowers not in a head bordered by many overlapping scales.
        J. Leaves with 3 or more main veins from base.
          K. Leaves with 3–9 main veins from base and many smaller veins straight and parallel (melastome venation)—Melastome Family (Melastomataceae), vol. 2, p. 696.
          KK. Leaves with 3 main veins from base and with small veins inconspicuous.
            L. Leaves aromatic, with distinctive odor when crushed—Laurel Family (Lauraceae), vol. 2, p. 182.
            LL. Leaves not aromatic—Box Family (Buxaceae; *Buxus*), vol. 2, p. 432.
        JJ. Leaves with 1 main vein or midvein.
          M. Nodes with rings.
            N. Stipules present.
              O. Stipules forming sheath around twig or paired and persistent.
                P. Leaves toothed—Chloranthus Family (Chloranthaceae; *Hedyosmum*), vol. 2, p. 94.
                PP. Leaves not toothed—Madder Family (Rubiaceae), vol. 2, p. 912.
              OO. Stipules not forming sheath, shedding early—Mangrove Family (Rhizophoraceae; *Cassipourea, Rhizophora*), vol. 2, p. 620.
            NN. Stipules none—Verbena Family (Verbenaceae), vol. 2, p. 854.
          MM. Nodes without rings.
            Q. Stipules present (sometimes minute or shedding early, leaving scar).
              R. Flowers small, inconspicuous.
                S. Petals 4 or 5, spreading; stamens alternate with petals—Bittersweet Family (Celastraceae), vol. 2, p. 458.
                SS. Petals 5 (sometimes none), hood-shaped; stamens opposite petals and often within—Buckthorn Family (Rhamnaceae), vol. 2, p. 498.
              RR. Flowers larger, often showy; petals fringed, with narrow stalk.
                T. Petals 5; fruit a drupe—Malpighia Family (Malpighiaceae), vol. 2, p. 36[illegible]
                TT. Petals mostly 6, sometimes 4 or 5; fruit a capsule—Loosestrife Family (Lythraceae), vol. 2, p. 608.
            QQ. Stipules none.
              U. Leaves with minute gland dots, often aromatic and with distinctive odor when crushed.
                V. Flowers irregular with 5-lobed crimson corolla; leaves with citrus-like odor when crushed—*Ravenia*, vol. 2, p. 332.
                VV. Flowers regular.
                W. Stamens many, petals 4–5—Myrtle Family (Myrtaceae), vol. [illegible] p. 622.
                WW. Stamens 12 or fewer, anthers opening by pores with lids, sepals [illegible] calyx lobes 6; odor of spices—Laurel Family (Lauraceae), v[illegible] 2, p. 182.
              UU. Leaves without minute gland dots.
                X. Leaves 3–4 at a node (whorled), narrowly oblong, mostly with f[illegible] minute sharp teeth—*Macadamia,** vol. 2, p. 140.
                XX. Leaves mostly 2 at a node (opposite), not toothed.
                Y. Petioles with 2 glands near blade—*Laguncularia*, vol. 1, p. 392.
                YY. Petioles without glands.

Z. Stamens 10 to many, ovary inferior.
a. Flowers large, more than 1 inch across, stamens many, petals 5–7—Pomegranate Family (Punicaceae; *Punica* *), vol. 2, p. 614.
aa. Flowers small, ½ inch, across, stamens 10, petals 5—*Mouriri*, vol. 2, p. 738.
ZZ. Stamens 10 or mostly fewer, ovary superior.
b. Corolla absent or of separate petals; flowers mostly unisexual.
c. Stamens 8 in 2 sets of 4, inserted in calyx tube—Mezereon Family (Thymeleaceae; *Daphnopsis*), vol. 2, p. 604.
cc. Stamens 2–10, separate or united.
d. Ovary exposed, 2-celled; corolla when present of 4 narrow white petals—Olive Family (Oleaceae), vol. 2, p. 804.
dd. Ovary enclosed in calyx tube, 1-celled; corolla absent—Four-o'clock Family (Nyctaginaceae), vol. 2, p. 162.
bb. Corolla of united petals; flowers bisexual.
e. Flowers regular, with 5-lobed spreading, waxy, orange or white corolla; fruit a berry—Theophrasta Family (Theophrastaceae; *Jacquinia*), vol. 2, p. 762.
ee. Flowers irregular.
f. Corolla tube short; fruit a drupe or 1–4 nutlets—Verbena Family (Verbenaceae), vol. 2, p. 854.
ff. Corolla tube long; fruit a capsule with winged seeds or a berry—Bignonia Family (Bignoniaceae), vol. 2, p. 888.

PART 4. LEAVES OPPOSITE, COMPOUND

A. Nodes with rings; leaves pinnate.
B. Leaflets all paired (even pinnate), 4–10, oblique or asymmetrical, not toothed—Caltrop Family (Zygophyllaceae; *Guaiacum*), vol. 2, p. 318.
BB. Leaflets of odd number (odd pinnate), symmetrical or nearly so, toothed (except *Hebestigma*).
C. Leaf axis winged; leaflets rounded at apex—Cunonia Family (Cunoniaceae; *Weinmannia*), vol. 2, p. 230.
CC. Leaf axis not winged; leaflets pointed at apex.
D. Leaflets 7–9, not toothed—*Hebestigma*,* vol. 2, p. 298.
DD. Leaflets toothed or lobed.
E. Leaflets finely toothed, not lobed.
F. Leaflets 5–11, elliptic or ovate, hairless or nearly so—Bladdernut Family (Staphyleaceae; *Turpinia*), vol. 2, p. 476.
FF. Leaflets 11–15, lance-shaped, densely hairy—Brunellia Family (Brunelliaceae; *Brunellia*), vol. 2, p. 230.
EE. Leaflets 3–7 (13), those at base deeply toothed and often divided into 3 lobes or leaflets (bipinnate)—Honeysuckle Family (Caprifoliaceae;* *Sambucus**), vol. 2, p. 980.
AA. Nodes without rings.
G. Leaflets 2–8, all paired (even pinnate)—*Matayba*, vol. 1, p. 304.
GG. Leaflets of odd number, odd pinnate or digitate (palmate) or 3 (trifoliolate).
H. Leaflets with minute gland dots, aromatic, with citruslike odor when crushed—*Amyris*, vol. 1, p. 216; vol. 2, p. 321.
HH. Leaflets without gland dots, not aromatic (except No. 685).
I. Leaves digitate; flowers with short corolla tube; fruit a drupe—*Vitex*, vol. 1, p. 486; vol. 2, p. 864.
II. Leaves digitate or pinnate (bipinnate in *Jacaranda*, vol. 1, p. 492); flowers with long corolla tube; fruit a capsule (mostly long and narrow) with many winged seeds—Bignonia Family (Bignoniaceae); vol. 2, p. 888.

TREE-FERN FAMILY (CYATHEACEAE)

Tree-ferns, plants without flowers, fruits, or seeds, known by: (1) unbranched trunk usually slender, bearing a circle of large spreading alternate leaves at apex, elliptic leaf scars below, often with scales and spines, and toward base mats of fibrous air roots; (2) very large fern leaves 2 or 3 times pinnate into numerous divisions often toothed on edges, with fine forking veins not forming network, unrolling from coil at apex; and (3) reproduction by numerous powdery spores produced in spore cases in brownish balls, dots, or lines on the lower surface of some leaves. Also vol. 1, p. 28.

Key to species

A. Leaf axis spiny.
  B. Spines of leaf axis minute, less than 1/16 inch long, absent from trunk; leaf bases with many golden brown scales to 1¼ inches long—252. *Cyathea tenera.*
  BB. Spines of leaf axis larger, also present on trunk.
    C. Leaf axis with spines less than ⅛ inch long and toward base with light brown scales less than ¾ inch long—251. *Cyathea aquilina.*
    CC. Leaf axis with black spines to ¼ inch long and toward base with many narrow blackish scales—255. *Nephelea portoricensis.*
AA. Leaf axis not spiny.
  D. Leaves twice pinnate (bipinnate), blades finely hairy—256. *Alsophila bryophila.*
  DD. Leaves 3 times pinnate (tripinnate), blades hairless or slightly hairy.
    E. Leaf axis with whitish scales to 1¼ inches long toward base—1. Helecho gigante, tree-fern, *Cyathea arborea* (L.) J. F. Smith.
    EE. Leaf axis with dark reddish brown scales toward base.
      F. Leaf divisions (pinnules) connected with axis along base; brown masses of spore cases and powdery spores on lower leaf surfaces about midway between border and midvein and borne in whitish cuplike base (indusium)—254. *Cyathea wilsonii.*
      FF. Leaf divisions (pinnules) separate from axis at base; brown masses of spore cases and powdery spores on lower leaf surfaces nearer border than midvein and borne in brownish cuplike base (indusium)—253. *Cyathea escuquensis.*

251. Helecho gigante, tree-fern — *Cyathea aquilina* (Christ) Domin

This locally abundant species of tree-fern is characterized by: (1) very spiny trunk, often with short curved branches, covered toward apex by crowded dead spiny leaf bases; and (2) large fernlike leaves about 5 feet long and 2½ feet wide, with blade divided 3 times (3-pinnate), the axis very spiny and with light brown scales toward base.

Evergreen tree-fern shrubby or a small tree becoming 15–20 feet high and 3–4 inches in trunk diameter. The spiny trunk toward base is brown or gray and partly covered by short air roots. Toward apex of trunk among the crowded spiny leaf bases pressed flat are old brown narrow pointed scales less than ¾ inch long. In Maricao Forest many plants produce after maturity several curved branches of 3–20 inches along the trunk. Within the hard dark brown outer layer is a whitish soft pith.

As many as 15 leaves are erect to spreading at apex of trunk, and old dead leaves droop and persist. The leaf axis (rachis) is grooved above, dark purplish brown with many straight spines 1/16–⅛ inch long in lower part, becoming light green toward tip. Many secondary or lateral axes (pinnae) 6–16 inches long bear many paired tapering divisions (pinnules) less than 3 inches long. The smallest segments are oblong, less than ⅜ inch long, rounded at apex, thin, hairless, and with the minutely wavy toothed edges turned under. The upper surface is green to dark green and slightly shiny, the lower surface dull light green.

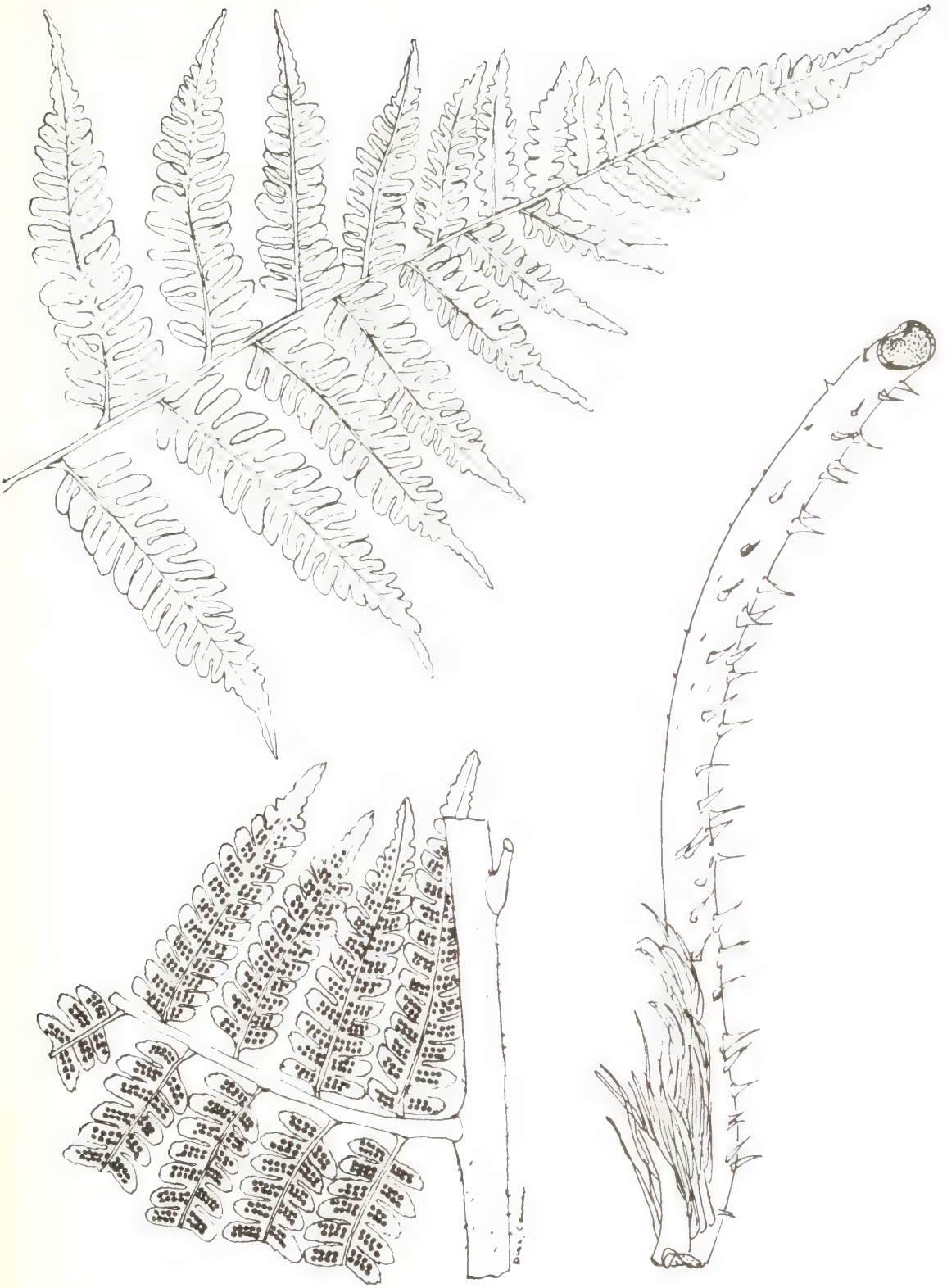
Lower surfaces of the segments of some leaves bear 2 rows of dark brown masses less than 1/16 inch across, of spore cases and powdery spores exposed without a covering (indusium).

Lower and upper Cordillera forests at 2,000–3,000 feet altitude and lower Luquillo forest at 1,500–2,000 feet. Abundant in Maricao Forest, rare elsewhere.

PUBLIC FORESTS.—Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

BOTANICAL SYNONYM.—*Alsophila aquilina* Christ.



251. Helecho gigante, tree-fern *Cyathea aquilina* (Christ) Domin

Upper leaf surface (above), lower leaf surface (lower left), base of leaf axis (lower right), natural size.

252. Helecho gigante, tree-fern *Cyathea tenera* (J. E. Sm.) Moore

An uncommon or rare large tree-fern of Puerto Rican mountains, distinguished by: (1) large fernlike leaves 5–10 feet long and 2–4 feet wide, with very thin blade divided 3 times (3-pinnate), slightly hairy on veins; and (2) the leaf axis with many golden-brown scales to 1¼ inches long toward base and with many minute spines less than 1/16 inch long in lower part.

Evergreen tree-fern to 20 feet high. The trunk 2–5 inches in diameter has fine air roots near base and near apex oval leaf scars 1¼ inches long but is not spiny.

The leaf axis (rachis) is grooved above, purplish, with many golden-brown scales toward base and with many minute spines in lower part. Young leaves unrolling from spiral coils have golden-brown scales. Secondary or lateral axes (pinnae) to 2 feet long are slightly winged and slightly hairy. The smallest divisions (pinnules) are mostly alternate, 2–4 inches long, slightly hairy along veins. The segments are ¼–⅜ inch long, slightly pointed forward, with rounded apex and finely wavy-toothed edges, dull green above and dull light green below.

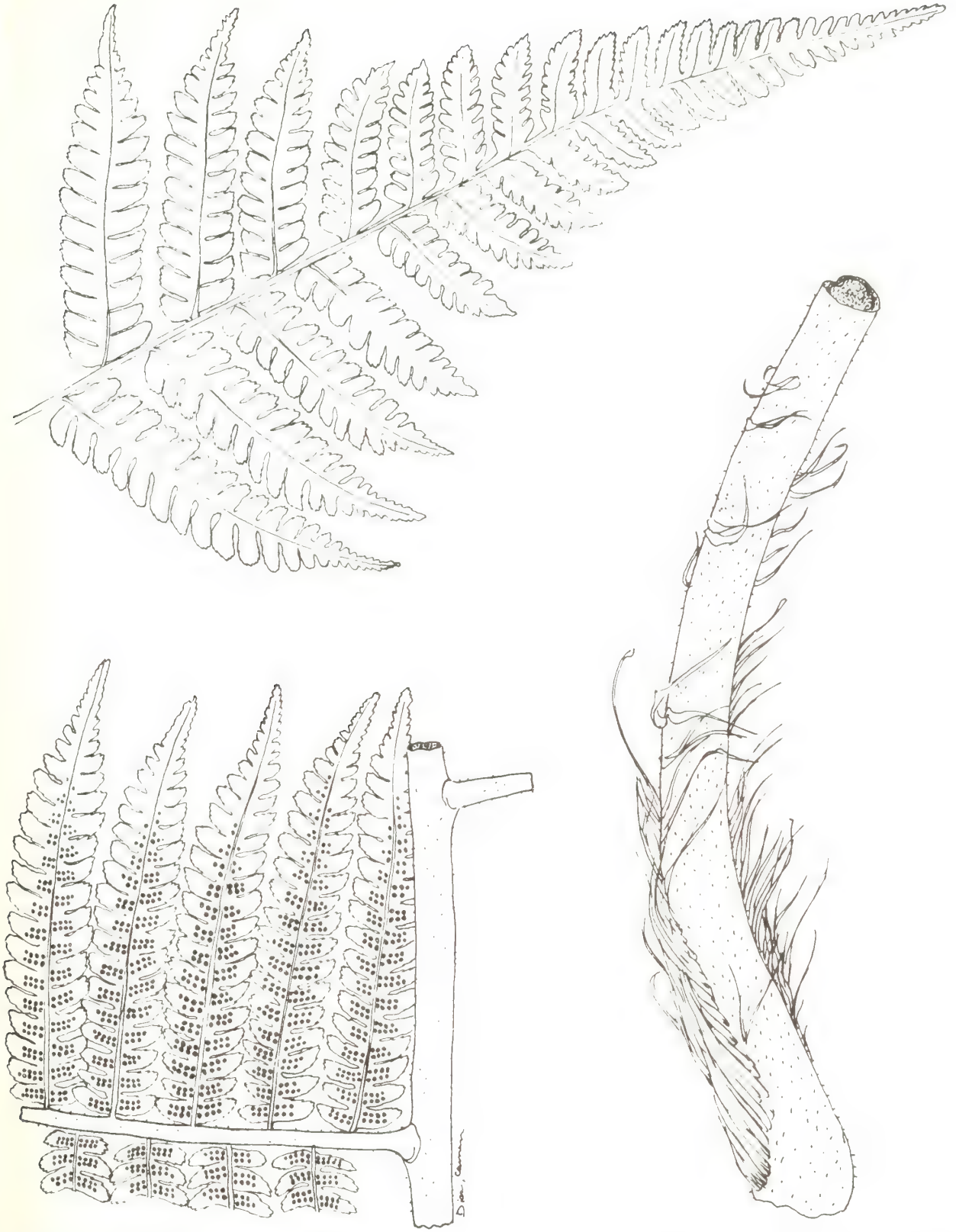
Near the midvein of the under surface of some leaf segments are 2 rows of tiny light golden-brown balls (indusia) about 1/32 inch in diameter, containing the masses of spore cases and powdery spores.

Upper Luquillo and upper Cordillera forests, including dwarf forest, at 2,000–4,000 feet altitude in mountains of Puerto Rico. Rare except locally common at Toro Negro Forest.

PUBLIC FORESTS.—Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Hispaniola, Puerto Rico, and Lesser Antilles to Trinidad.

BOTANICAL SYNONYM.—*Cyathea brittoniana* Maxon.



252. Helecho gigante, tree-fern *Cyathea tenera* (J. E. Sm.) Moore

Upper leaf surface (above), lower leaf surface (lower left), base of leaf axis (lower right), natural size.

253. Helecho gigante, tree-fern *Cyathea escuquensis* **(Karst.) Domin**

This uncommon small tree-fern is identified by: (1) large fernlike leaves 4½–7 feet long and 2½–3 feet wide, with blade divided 3 times (3-pinnate); and (2) the leaf axis with dark reddish-brown scales toward base, without spines.

Evergreen tree-fern shrubby or a small tree to 15 feet high with spineless dark brown trunk to 5 inches in diameter and several spreading leaves at apex, the old leaves gradually shedding. The trunk has a hard blackish outer layer and whitish pith. The leaf axis (rachis) is flattened or grooved above, purplish to dull green, with dark reddish-brown scales about ½ inch long toward base. Many secondary or lateral axes (pinnae) to 24 inches long bear many alternate tapering divisions (pinnules) 4–6 inches long, separate from axis at base and often slightly stalked, hairless except for minute hairs on veins. The smallest segments are oblong, less than ⅝ inch long, rounded at apex, thin, with minutely wavy-toothed edges turned under slightly. The upper surface is shiny green and the lower surface dull light green.

The brown masses of spore cases and powdery spores on lower surfaces of some leaves are nearer the border than midvein and about ⅓ inch across, borne in a cuplike brownish base (indusium).

Uncommon in lower and upper Luquillo and upper Cordillera forests at 1,500–4,000 feet altitude in mountains of Puerto Rico.

PUBLIC FORESTS.—Luquillo, Maricao, Toro Negro.

RANGE.—Hispaniola, Puerto Rico, Colombia and Venezuela.

BOTANICAL SYNONYM.—*Hemitelia escuquensis* Karst.

Named for Escuque, near Maracaibo, Venezuela, where first collected more than a century ago.

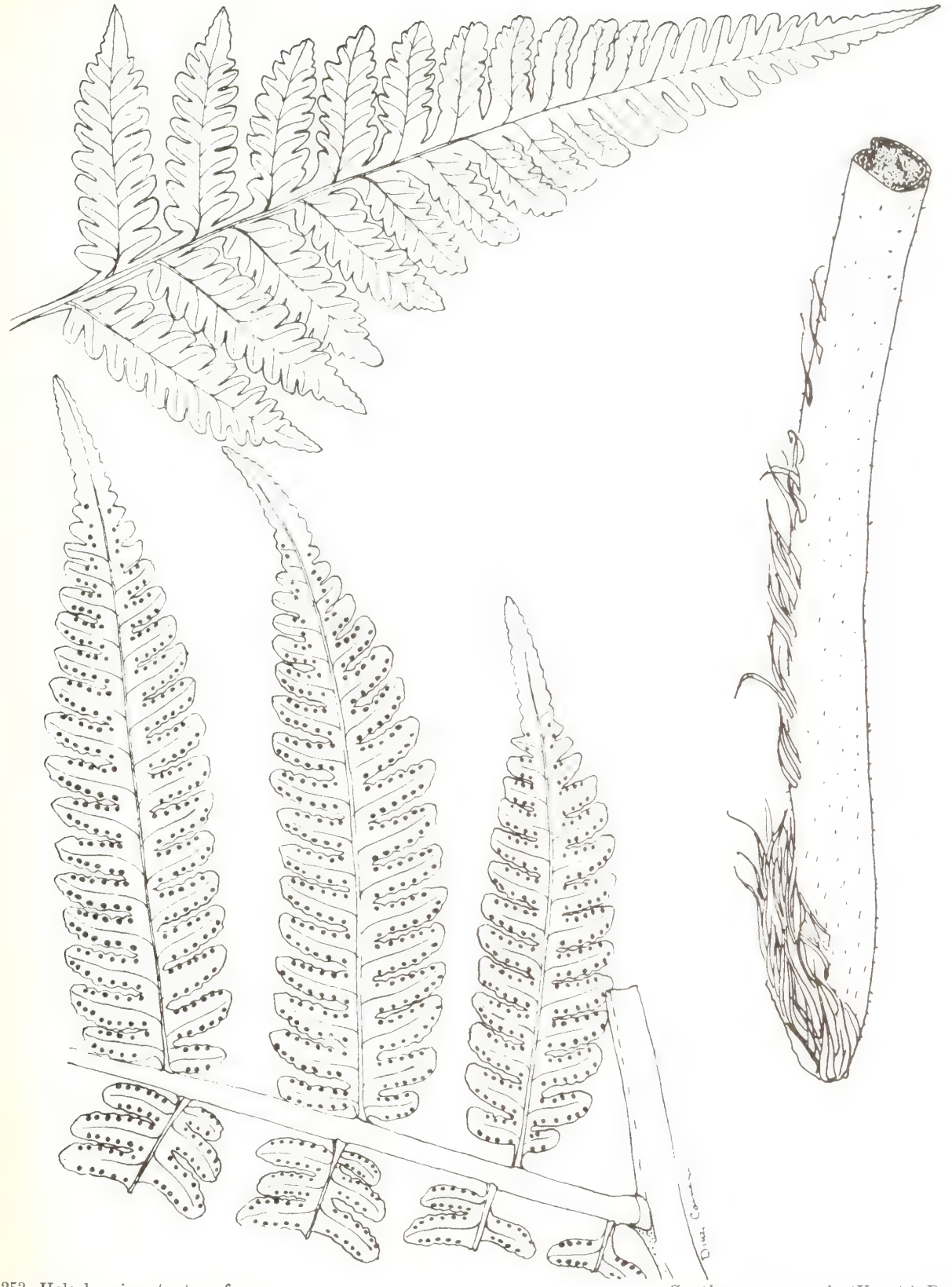
254. Helecho gigante, tree-fern *Cyathea wilsonii* **(Hook.) Procto**

This rare species becoming 15 feet high and 4 inches in trunk diameter is related to No. 253 and is characterized by: (1) the secondary leaf divisions (pinnules) connected with axis along base; and (2) brown masses of spore cases and powdery spores on lower leaf surfaces about midway between border and midvein and borne in whitish cuplike base (indusium). Lower Luquillo and lower Cordillera forests at 300–4,000 feet altitude in moist foothills and mountains of Puerto Rico.

PUBLIC FORESTS.—Luquillo, Maricao, Toro Negro.

RANGE.—Jamaica, Hispaniola, and Puerto Rico.

BOTANICAL SYNONYM.—*Hemitelia wilsonii* Hook.



253. Helecho gigante, tree-fern *Cyathea escuquensis* (Karst.) Domin

Upper leaf surface, (above), lower leaf surface (lower left), base of leaf axis (lower right), natural size.

255. Helecho gigante espinoso, tree-fern *Nephelea portoricensis* (Spreng.) Tryon

This locally common tree-fern known only from Puerto Rican mountains is identified by: (1) black spines to ¼ inch long on trunk and the dark purplish-brown leaf axis (rachis); and (2) large horizontal fernlike leaves mostly 5–8 feet long and 1–2 feet wide, with blade divided 3 times (3-pinnate), slighty hairy on axes and midveins.

Evergreen tree-fern to 20 feet high. The dark brown trunk 2–5 inches in diameter has many small air roots in lower part, many spines ¼ inch long in upper part, and old dead leaf axes hanging down near apex.

The leaf axis (rachis) is grooved above, dark purplish brown, with many sharp slender black spines ¼ inch or less in length, also narrow blackish scales near base. Secondary or lateral axes (pinnae) to 2 feet long are dark purplish brown and finely hairy. The smallest divisions (pinnules) are mostly alternate and about 3 inches long, finely hairy on midveins. Segments are oblong, slightly pointed forward, rounded at apex with border finely wavy, thin or slightly stiff and leathery, the upper surface dull green and hairless except along midvein, the lower surface dull light green and hairy along veins.

Two rows of tiny dark brown balls (indusia) 1/16 inch in diameter, deeply cup-shaped and hairy, are borne near the midvein of the under surface of some leaf segments and contain the masses of spore cases and powdery spores.

Locally common in understory of upper Luquillo and upper Cordillera forests at 2,000–4,000 feet altitude in high mountains of Puerto Rico. Especially in wet shaded ravines and slopes and noted also in an old coffee plantation.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rico.

255. Helecho gigante espinoso, tree-fern *Nephelea portoricensis* (Spreng.) Tryon

Upper leaf surface (above), lower leaf surface (lower left), base of leaf axis (lower right), natural size.

256. Helecho gigante de la sierra, tree-fern ***Alsophila bryophila*** **Tryon**

One of the most distinctive tree-ferns and common, characterized by: (1) flat-topped crown composed of horizontal leaves; (2) large fernlike leaves 4–8 feet long and 1–2 feet wide, finely hairy, with blade divided only twice (2-pinnate) with narrow oblong outline, the secondary or lateral axes (pinnae) mostly 6–10 inches long; and (3) leaf axis bristly in lower part, the bristles resembling spines but soft.

Evergreen tree-fern 15 feet or more in height. The stout trunk 3–6 inches in diameter, dark brown, with some small air roots, often covered with mosses and liverworts, with old deaf leaf axes hanging down and oval leaf scars about 1 inch long, not spiny as reported. Trunk composed of thin very hard outer layer and hard black bundles scattered in light brown soft tasteless pith.

Leaves about 15, spreading and in age hanging down and falling. The axis (rachis) is dark purplish brown, with brown bristly hairs and very narrow scales in lower part, the upper part finely hairy. Secondary or lateral axes (pinnae) mostly 6–11 inches long, with slender brownish-green axis, finely hairy. Segments about 40–60 pairs about ½ inch long, more than ⅛ inch wide, oblong, thin or slightly thickened, slightly curved forward, rounded at apex, border minutely wavy toothed and slightly turned under, the upper surface dull dark green and with scattered hairs or nearly hairless, the lower surface dull light green and hairy, especially on veins.

Lower surfaces of segments of some leaves bear near midvein 2 rows of 7–10 brown dotlike masses of spore cases and powdery spores in a shallow cup (indusium).

Locally common on peaks and ridges at 2,000–4,000 feet altitude in upper Luquillo and upper Cordillera forests of mountains of Puerto Rico. Common in understory of palm forest and in dwarf forest.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Toro Negro.

RANGE.—Puerto Rico only.

Named as a new species in 1972. Long known as *Cyathea pubescens* Mett. However, that species, now *Nephelea pubescens* (Mett.) Tryon, is limited to Jamaica.

256. Helecho gigante de la sierra, tree-fern *Alsophila bryophila* Tryon

Upper leaf surface (above), lower leaf surface (below), natural size.

Palmlike evergreen shrubs and trees of slow growth, without flowers or fruits, known by: (1) stout trunk (or none), mostly unbranched, covered by diamond-shaped scars or leaf bases, with thick pith; (2) large spreading leaves alternate and crowded in circle at apex of trunk, palmlike, pinnate, with stout axis and many narrow pointed thickened leathery leaflets often toothed on edges, with forking veins (dichotomous), persistent several years; and (3) plant male and female (dioecious) with large cylindric cones (strobili), the male cones wit many cone-scales bearing many scattered spo cases and abundant pollen, and female con with many cone-scales bearing at base larg naked seeds with fleshy coat and 2(1–3) co yledons.

257. Cica, crozier cycas *Cycas circinalis* L.

Cycads are palmlike or fernlike plants belonging to the gymnosperms, plants with naked seeds but no flowers, and thus are more closely related to the conifers than to flowering plants. This handsome ornamental species is distinguished by: (1) stout unbranched trunk becoming 15 feet or more in height and 1 foot in diameter, slightly rough with alternating bands of scales and leaf bases or diamond-shaped leaf scars; (2) many crowded palmlike leaves clustered at top of trunk, 5–8 feet long, pinnate, composed of very many narrow dark green drooping leaflets or segments; (3) erect cylindric brown male cones to 1½ feet long and 5 inches in diameter, borne on male plants and producing pollen; and (4) gray to orange elliptic seeds 1½–2¼ inches long, borne exposed along edges of short woolly leaves on female plants (dioecious).

An evergreen ornamental shrub or small tree to 20 feet high, unbranched except by accident, such as cutting of apex. The stout trunk has a hard outer layer like bark, light brown gray, slightly scaly, and becoming slightly fissured. The alternating horizontal bands or rings represent stages of growth, perhaps annual. The trunk ends in a very large pointed bud composed of many tawny-brown narrow scales about 4 inches long, which form a band from their bases. Then a new growth of about 50 or more leaves is produced at the same time and after shedding forms another band of diamond-shaped leaf scars.

The crowded leaves have a stout axis with 2 rows of short spines replacing leaflets toward base. There are very many mostly opposite thick, stiff, hairless leaflets 6–12 inches long and ½–⅝ inch wide, straight or slightly curved, long-pointed at apex, and extending down axis at base, flat or nearly so at edges, with prominent yellowish midvein but without other visible veins, slightly shiny dark green on upper surface and yellow green beneath. Old leaves turn brown, hang down, and finally fall off or are cut, the base of the axis forming a diamond-shaped scar.

Male trees bear large brown male cones, har and woody, which produce pollen in many do like sacs on the lower surface of numero scales 1¼–2 inches long, ending in long narro point. Female trees produce a ring of lig brown woolly fertile leaves 6–12 inches lon Each leaf bears in notches along the axis 4– naked elliptic or nutlike seeds, hard with th outer flesh. Observed with seeds in Februar

The starchy pith of this and other cyc trunks has been made into flour and bre where the plants are wild. Also, the seed which are very poisonous when eaten raw, c be ground into flour.

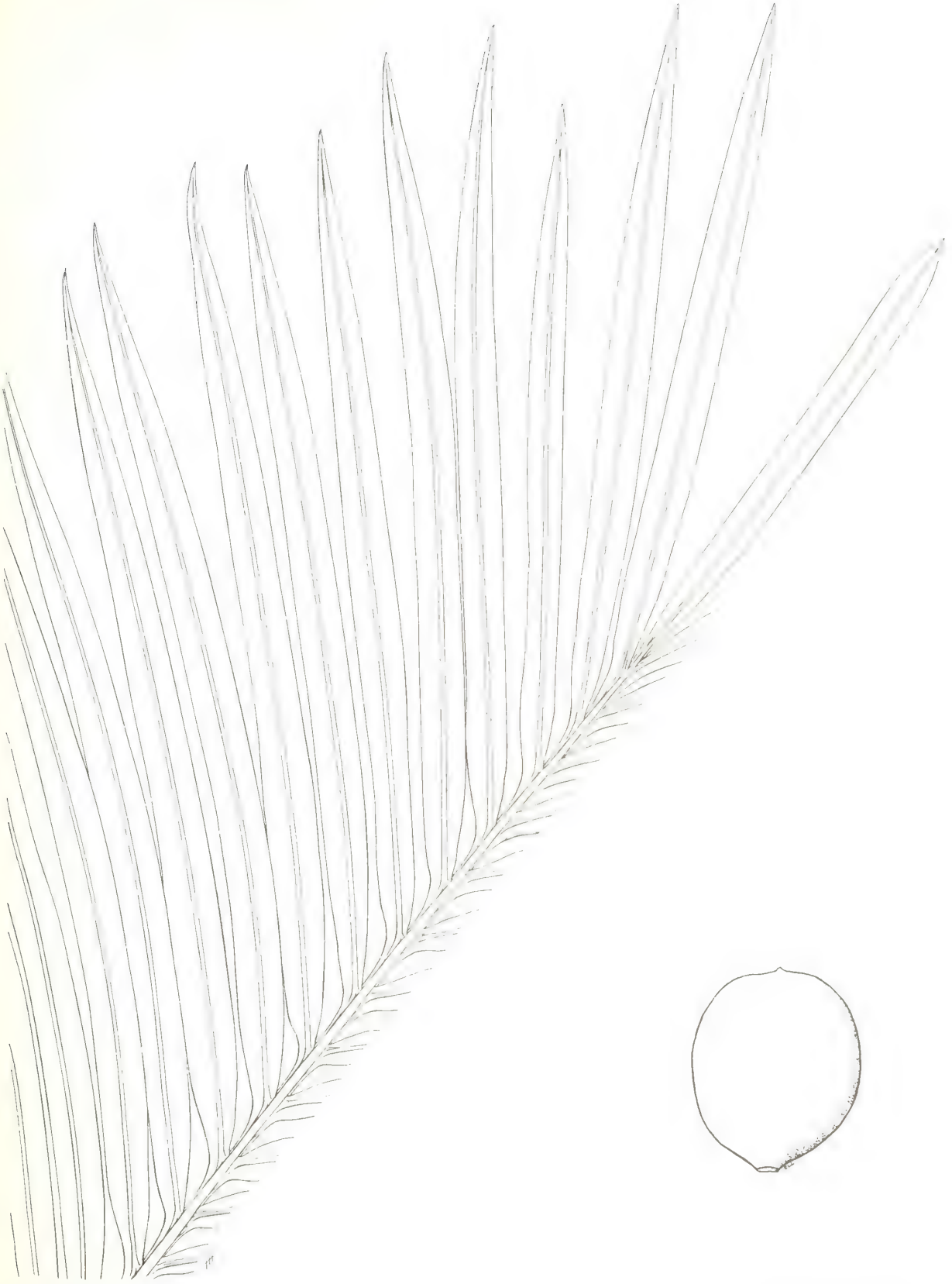
Occasionally planted for ornament and gardens in Puerto Rico and Virgin Islands a through the tropics. Easily propagated fro the suckers or sprouts at the base of lar plants or from seeds but grows very slow Cultivated in southern Florida in areas that a nearly frostless or protected from frost.

RANGE.—Native from tropical Africa throu southern Asia and Pacific Islands to Philippi and Guam. Introduced through the tropics.

OTHER COMMON NAMES.—cica, cicadá (Spanish); false sago-palm, sago-palm, cyc East Indian cycas (English); queen sa (United States); foengobon, foengoe-pal krans-palm (Dutch Antilles).

Cica, sago-palm, *Cycas revoluta* Thunb known also as palma de sagú, is a rela shrubby species more common in cultivation Puerto Rico and the Virgin Islands and el where. It is mostly less than 6 feet high, ha short narrow trunk, leaves mostly 2–5 feet lo and shorter narrower leaflets ending in sp tip and turned under at edges. Native of Ja

One genus of the cycad family, *Zamia*, represented in Puerto Rico by 3 native shrul species known as marunguey and arrowr These trunkless plants have an enlarged und ground stem which bears a cluster of seve spreading palmlike pinnate leaves 1–3 feet lo Scattered in limestone regions of Puerto R The foliage is poisonous to livestock. Indi made starch and bread from the enlar underground stems of related species elsewh



257. Cica, crozier cycas

Cycas circinalis L.*

Portion of leaf and seed (lower right), two-thirds natural size.

PODOCARP FAMILY (PODOCARPACEAE)

Trees, sometimes shrubs, without flowers or fruits, known by: (1) evergreen trees mostly with straight axis and narrow crown, usually with soft lightweight wood without vessels (nonporous) and without resin ducts; (2) leaves alternate or rarely opposite, in 2 rows (in *Phyllocladus* replaced by leaflike branches), needlelike, lanceolate, or scalelike, without stipules; (3) pollen in male cones (strobili) and naked seeds borne on different plants (dic cious) or the same plant (monoecious); a (4) naked seeds solitary and often with flesl stalk or few in small female cones of few cor scales, with 2 cotyledons. Formerly and in v 1, p. 30, included in yew family (Taxaceae

One species: 2. Caobilla, podocarp, *Poo carpus coriaceus* L. C. Rich.

ARAUCARIA FAMILY (ARAUCARIACEAE*)

Trees often large, without flowers or fruits, known by: (1) resinous evergreen trees with straight axis, narrow crown, and branches often in whorls, usually with resinous soft lightweight wood without vessels (nonporous); (2) leaves alternate often in 2 rows, of 2 forms, lanceolate or awl-shaped, leathery, with fine parallel veins, without stipules; (3) pollen a naked seeds borne on different plants (di cious) or same plant (monoecious) in separ large cones (strobili); (4) female cones woo of many cone-scales which fall at maturity; a (5) naked seeds 1 at base of cone-scale, wit or 2 lateral wings and 2 or 4 cotyledons.

Key to species

A. Leaves minute, ¼–½ inch long, of 2 kinds, needlelike or scalelike, crowded and extending on all sides of twi– 259. *Araucaria heterophylla.**

AA. Leaves 4–5 inches long, oblong or narrowly ovate, without visible veins, mostly opposite, spreading in 2 row– 258. *Agathis robusta.**

258. Kauri, Queensland kauri — *Agathis robusta* (C. Moore) F. M. Bail *

This evergreen coniferous tree introduced from Australia in recent years for forestry tests is recognized by: (1) the stout straight trunk with gray or brownish smoothish resinous bark and whorled branching; (2) dark green foliage of mostly opposite oblong or narrowly ovate, stiff and leathery leaves commonly 4–5 inches long, without visible veins, spreading in 2 rows along light green twigs; and (3) egg-shaped or rounded woody cones 4–5 inches long.

Queensland kauri is a large forest tree becoming at maturity in its native home 100–150 feet tall and 3–4 feet or more in trunk diameter. Immature trees in Puerto Rico have reached 50 feet or more in height and 1½ feet in diameter. The axis bears a long narrow crown, rounded at top, of short spreading, horizontal and slightly drooping branches of dense dark green foliage. The bark is gray or brownish, smoothish, slightly scaly and flaky. Gray resin flows from cuts. Inner bark is dark red, resinous, with turpentine taste. Twigs are light green, smooth, and hairless, becoming light brown and finely fissured. The end bud is rounded, about 3/16 inch across, light green, covered by sev al rounded closely pressed and overlapping sca s.

The leaves are mostly paired or oppos e, hairless, with short, flattened light green p i-oles less than ¼ inch long. Blades are mo y 4–5 inches long and 1–1½ inches wide, so e-times as large as 6 by 2¼ inches or as smal s 2 by ½ inch, slightly curved upward tow d margin, short-pointed at base and gradu y narrowed to blunt apex, the upper surface sl y dark green, and the lower surface dull l t green. Upon drying, many fine parallel v s become visible.

Male cones are stalkless, cylindric, d rk brown, 2–4 inches long and ¼–½ inch in di m-eter, composed of numerous minute scales, b r-ing pollen, formed in large numbers singl at leaf bases, falling after pollination. Seed-b r-ing or female cones few, borne singly at en of twigs on the same tree (monoecious), d rk brown, consisting of many fan-shaped, poi d, thick and hard overlapping cone-scales, ch bearing 1 seed, falling at maturity. Seeds b-long, flattened, ½ inch long, with large w g.

258. Kauri, Queensland kauri *Agathis robusta* (C. Moore) F. M. Bailey *

Leafy twig (above), seed and cone scale (lower left), cone (lower right), two-thirds natural size.

The wood is cream to light brown, lightweight (specific gravity 0.40), fine-textured. It is important locally where native for cabinetwork and interiors, being easily worked and taking paint and polish well. Also suited to construction and pulpwood.

Resin of clear pale brown color is obtained fresh from the trees and in the fossil state from soil under the forests. Quantities from this and related species have served like turpentine in the manufacture of paint and varnish.

Native of Australia, this rapidly growing conifer is being tested in Puerto Rico. Possibly it may be a good forest tree for mountain sites with high rainfall. Planted from sea level to 2,500 feet altitude in the upper Cordillera an upper Luquillo forests. This species, thoug still rare and local, is also a handsome orna mental with attractive narrow crown of dar green foliage. One large specimen is located i front of the Forest Service office building at Ri Piedras.

PUBLIC FORESTS.—Luquillo, Maricao.

RANGE.—Queensland and Fraser Island, Au tralia, but introduced in humid tropical land

OTHER COMMON NAMES.—kauri, kauri-pin Australia kauri, dundathu-pine (English).

BOTANICAL SYNONYMS.—*Agathis brown* (Lemaire) L. H. Bailey, *Damara robusta* (Moore.

259. Araucaria, Norfolk-Island-pine — *Araucaria heterophylla* (Salisb.) Franco

Norfolk-Island-pine is a handsome ornamental tree that has become popular in Puerto Rico in recent years. It is easily recognized by: (1) the distinct symmetrical form with large erect straight axis ending in a point, with narrow conical crown of dark green foliage; (2) horizontal branches regular in whorls of 4–7; (3) many slender ropelike twigs regularly arranged in a horizontal plane; (4) very numerous minute leaves ¼–½ inch long, crowded and extending on all sides of the twig, of 2 kinds, needlelike or on large trees broader and scalelike; and (5) the rounded hard cone 4–5 inches long, with many cone-scales ending in a narrow curved point.

Evergreen resinous introduced ornamental tree, in Puerto Rico mostly young and of small size. Elsewhere in cultivation becoming in age a large tree 80 feet high, with straight trunk 3 feet in diameter, enlarged at base or with small broad buttresses. The bark is blackish, almost smooth, with whitish resin drops of turpentine taste. The very slender lateral twigs 4–8 inches long are covered by the leaf bases and with the leaves form cylindric masses ⅜ inch broad, ending in an indistinct bud of very short young leaves.

The leaves are crowded and alternate in spirals, evergreen, falling together with the twig, hairless, of 2 kinds on different twigs, without petiole. Juvenile leaves have the form of a curved narrow needle, triangular in cross section, while adult leaves have the form of a broad curved pointed scale.

Male and female cones are produced on different trees (dioecious). The male cones are oblong, 1½–2 inches long. Female cones ar rounded, 4–5 inches long, composed of man overlapping brown hard winglike cone-scale about 1½ inches long and broad, ending in narrow curved point almost ⅜ inch long, fallin apart at maturity. One large oblong edible see nearly 1¼ inches long is attached to the con scale and at maturity sheds with it like winged seed. However, cones and seeds seldo mature in cultivation in Puerto Rico.

The wood is described as soft like that pines and other conifers.

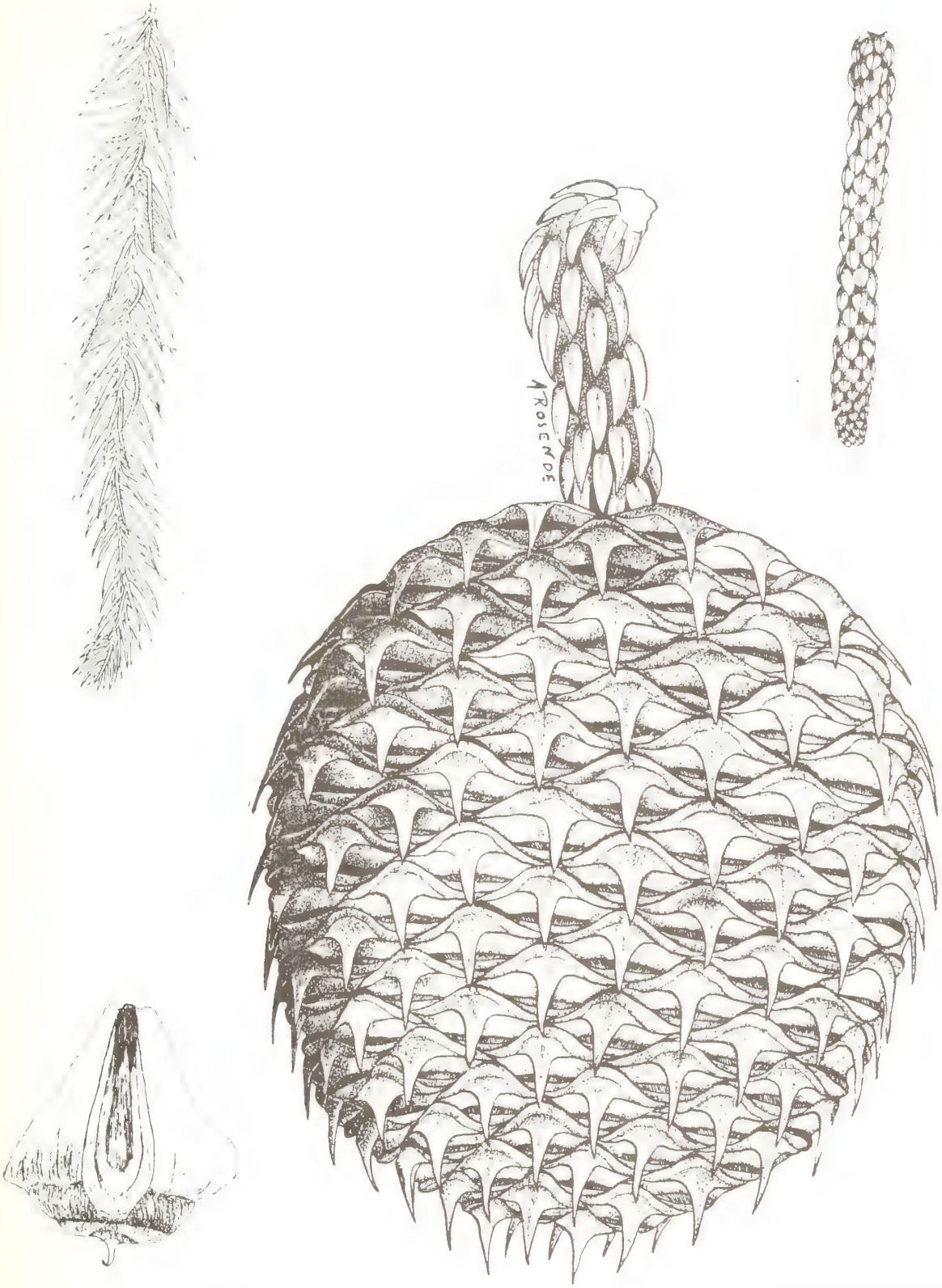
Norfolk-Island-pine is often grown for orn ment around city homes in moist parts Puerto Rico, especially San Juan. It is frequen in parks and gardens, also in forest plantation in subtropical and tropical climates througho the world. Northward in temperate regions t plants are raised indoors in pots or under glas resembling Christmas trees.

RANGE.—Native only on Norfolk Island b tween New Zealand and New Caledonia in t South Pacific. Extensively cultivated in su tropical and tropical climates of the world; f example, from Florida, southern Arizona, a California south to Argentina and in Hawa

OTHER COMMON NAMES.—araucaria (Spa ish, English); Christmas-tree (British Hond ras); siete pisos (Cuba, Dominican Republic

BOTANICAL SYNONYM.—*Araucaria excel* (Lam.) R. Br.

The generic name is derived from Arauco, t province of Chile of the type species, monke puzzle araucaria (*Araucaria araucana* (M lina) K. Koch). The specific name meaning di ferent leaves refers to the 2 types of foliage.



259. Araucaria, Norfolk-Island-pine *Araucaria heterophylla* (Salisb.) Franco *

Twig with needlelike leaves (upper left), twig with scalelike leaves (upper right), seed with cone scale (lower left), and cone, natural size.

Trees, becoming large to very large, without flowers or fruits, known by: (1) resinous mostly evergreen trees with straight axis and narrow crown, usually with soft lightweight wood without vessels (nonporous) and with resin ducts; (2) leaves mostly alternate or whorled, sometimes of 2 forms, very narrow and needlelike, with resin ducts, without stipules; (3) pollen and naked seeds borne on same plant (monoecious) in separate cones (strobili) with many spirally arranged flattened cone-scales, the male cones small and herbaceous; (4) female cones large and woody, of cone-scales each above a bract; and (5) seeds naked, usually 2 at base of a cone-scale, mostly with wing at end, with 2–15 cotyledons.

260. Pino hondureño, Caribbean pine ***Pinus caribaea* Morelet***

Pines are easily recognized by their needlelike evergreen leaves usually 2–5 in a bundle with a sheath at base and their hard cones with usually 2 long-winged seeds at the base of a cone-scale. Not native in Puerto Rico, these conifers are found mostly in forest plantations or as ornamentals. This species is the best adapted to Puerto Rico of several that have been tested. Caribbean pine is distinguished by: (1) resinous tree with straight axis and regular or symmetrical branches; (2) leaves needlelike, 3 in a bundle, 8–11 inches long; (3) reddish brown conical cones mostly 3–4 inches long and 1¼–1½ inches in diameter (closed), the many cone-scales ending in a stout prickle; and (4) seeds 1¼ inches long, including the detachable wing 1 inch long.

Large introduced evergreen tree becoming in its native home 80–100 feet tall and 1–2 feet in trunk diameter, with straight axis and thin conical crown of regular rings or whorls of horizontal branches ending in clusters of needlelike foliage, resinous throughout and with odor like turpentine. Bark gray, rough, thick, with long scaly ridges or plates and deep furrows exposing the reddish-brown inner bark composed of rings like wood. The gray, scaly horizontal branches end in stout whitish-gray twigs.

The 3 needles have at base a gray-brown persistent sheath ½ inch long. They are less than 1/16 inch wide, dark green, sharp-pointed, slightly stiff, slightly rough on edges from minute teeth, and remain attached a few years.

Like other gymnosperms and other conifers, pines bear exposed or naked seeds usually among scales of a cone, and differ from the flowers and seeds enclosed in a fruit. Caribbean pine produces its pollen or male element in male cones, narrowly cylindric, red brown, about 2 inches long and ¼ inch in diameter, usually in numbers on lower side twigs and falling soon after pollen is shed.

The female cones are borne usually 1–3 near the ends of erect twigs in the upper part of the same tree (monoecious). Less than ½ inch long at pollination, they are less than ¾ inch long as year-old conelets and continue to grow until maturity in September of the second year. The mature cone has a short stalk and may remain attached a few years. However, it usually opens to release the winged seeds.

The wood is reddish brown, soft, moderately lightweight (specific gravity 0.61–0.66), and resinous. Where the trees are native, the general utility lumber is widely used. In Puerto Rico the wood is a potential source of both lumber and long-fiber pulp. Also, pine posts could be available, as preservative is absorbed well without pressure treatment.

Pines are sparingly used in landscaping in Puerto Rico and are attractive while young. Small plants are suitable also for Christmas trees.

Caribbean pine has been planted widely in Puerto Rico, mostly in the central mountains at 500–2,500 feet altitude, and is common locally. Apparently it is well adapted to sandy and well-drained clay soils. It is suited to and found in lower and upper Cordillera and Luquillo regions. However, pine is rare or absent in the offshore islands and Virgin Islands.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Bahamas, western Cuba and Isle of Pines, and Central America in British Honduras, Guatemala, Honduras, and Nicaragua.

Three geographic varieties of this species as Caribbean pine are distinguished. Caribbean pine (typical; *Pinus caribaea* var. *caribaea*) is found in western Cuba and Isle of Pines. Bahaman pine (*P. caribaea* var. *bahamensis* Barrett & Golfari) is the pine native in Bahama Islands. Honduran pine or pino hondureño (*P. caribaea* var. *hondurensis* Barrett & Golfari), the Central American variety, is the one best adapted to Puerto Rico and recommended for forest planting.

OTHER COMMON NAMES.—pino, pino caribe (Puerto Rico); pino, pino blanco (Spanish); pino amarillo, pino macho (Cuba); pino colorado, ocote (Guatemala); Caribbean pine, Honduran pine (English); pitch pine, black pine, white pine (British Honduras).

BOTANICAL SYNONYM.—*Pinus hondurensis* Loock.

260. Pino hondureño, Caribbean pine *Pinus caribaea* Morelet *

Year-old conelets (upper left), closed cone (center left), open cone (lower left), leafy twig (right), two-thirds natural size.

Trees and shrubs, without flowers or fruits, known by: (1) resinous evergreen trees and shrubs mostly with straight axis and narrow crown, usually with soft lightweight wood without vessels (nonporous) and without resin ducts; (2) leaves opposite or whorled, usually of 2 forms, mostly small and scalelike or awl-shaped and producing flattened or angled twigs, without stipules; (3) pollen and naked seeds borne mostly on same plant (monoecious) in separate small cones (strobili) with few cone-scales, the male cones herbaceous; (4) female cones woody (berrylike in *Juniperus*), usually of few cone-scales opposite or whorled and flattened or attached by middle; and (5) seeds naked, 1–2 at a cone-scale, often with 2 lateral wings, mostly with 2–4 (6) cotyledons.

Key to species

A. Leafy twigs flattened, ¼ inch wide, composed of flattened scalelike leaves, branching in vertical fanlike or fernlike sprays; cones egg-shaped, ⅝ inch long, with usually 6 scales ending in hooked point—263. *Thuja orientalis.**

AA. Leaf twigs slender, 4-angled, less than 1/16 inch wide, composed of crowded paired pointed scale leaves; cones rounded, hard—*Cupressus.*

B. Leaves with gland dot on back; cones 1½ inches in diameter—262. *Cupressus sempervirens.**

BB. Leaves without gland dot; cones about ⅝ inch in diameter—261. *Cupressus lusitanica.**

261. Ciprés, Mexican cypress ***Cupressus lusitanica* Mill.***

This handsome aromatic, resinous conifer has been introduced for ornament and reforestation tests. It is distinguished by: (1) the very slender twigs branched in 4 rows, 4-angled and less than 1/16 inch across; (2) crowded minute scalelike dark green leaves pointed and only about 1/16 inch long; and (3) rounded brown hard cones about ⅝ inch in diameter.

An evergreen tree generally small or medium-sized, becoming 45 feet in height and 1½ feet in trunk diameter or where native a large tree, with straight erect axis and dense regular or narrow crown of green to dark green foliage. The bark is reddish brown, smooth to fissured and sometimes with few scales or shreddy. Inner bark is whitish, slightly fibrous, and slightly resinous. The numerous twigs branch regularly in 4 rows, becoming reddish brown, rough and scaly with dead leaves persistent.

The leaves are crowded, opposite in 4 rows, mostly dark green, short-pointed, angled or keeled, and with an inconspicuous gland dot. The foliage has a resinous odor and taste.

Pollen and seeds are borne on the same tree (monoecious). The male cones are numerous toward the apex of short branches, cylindric, 3/16 inch long and less than ⅛ inch broad, greenish yellow, the scales in 4 rows bearing pollen sacs and pollen.

The female cones (strobili) begin as a few inconspicuous green scales less than ⅛ inch across, with naked ovules, at the end of short twigs. At maturity the second year the hard woody cone changes color from whitish green to dull brown. It is composed mostly of 8 rounded but angular cone-scales, pressed together at edges, each with a stout central raised point about ⅛ inch high. Later the cone opens to free numerous naked brown seeds more than ⅛ inch long, irregularly flattened with borders slightly winged.

The sapwood is whitish and soft. Elsewhere the wood is utilized in carpentry and construction like that of other conifers.

For ornament the plants can be pruned in different shapes or trimmed also as living hedges. Small symmetric plants 3–6 feet high would serve as attractive Christmas trees and could be grown in plantations for this purpose. The leafy branches serve for decorations and wreaths also. In some countries this species is employed in reforestation.

Occasionally planted in Puerto Rico for ornament and reforestation. Subject to windthrow on poorly drained soils.

PUBLIC FORESTS.—Carite, Guilarte, Maricao, Río Abajo, Toro Negro.

RANGE.—Native in mountains of Mexico, Guatemala, El Salvador, and Honduras. Widely spread in cultivation and naturalized southward in mountains to Costa Rica and in Andes from Colombia and Venezuela to Argentina and Chile and in the Old World. Introduced in northern Florida.

OTHER COMMON NAMES.—ciprés mexicano (Puerto Rico); ciprés (Spanish); Mexican cypress, Portuguese cypress (English); ciprés de México, cedro, tlascal, táscate (Mexico).

BOTANICAL SYNONYMS.—*Cupressus benthamii* Endl., *C. lindleyi* Klotzsch.

This variable species consists of several forms. One has drooping or weeping branches and another a very long and narrow columnar crown. The scientific name, meaning of Portugal, was based on planted trees in that country before the origin was definitely known.

261. Ciprés, Mexican cypress *Cupressus lusitanica* Mill.*

Twig with cones and male cones, natural size.

262. Ciprés italiano, Italian cypress ***Cupressus sempervirens* L.***

Italian cypress, an introduced conifer occasionally planted for ornament, is readily identified by: (1) the very narrow columnar crown; (2) the minute dull gray-green scalelike leaves less than $\frac{1}{16}$ inch long, resinous with a gland dot on back, crowded, paired, and forming 4-angled twigs; and (3) rounded hard gray or brown cones 1–$1\frac{1}{4}$ inches in diameter. Distinguished from No. 261, ciprés, Mexican cypress (*Cupressus lusitanica* Mill.*), by the narrow shape, gland dot on the scalelike leaves, and the larger cones.

Medium-sized evergreen tree, coniferous and resinous, becoming 60 feet high and $1\frac{1}{2}$ feet in trunk diameter. In its native home this is a large tree with stout trunk and spreading branches. The variety commonly cultivated has a very narrow long crown composed of short erect branches. Bark is gray, smooth or slightly fissured, and thin. Leafy twigs are alternate, numerous, crowded and spreading, much branched, slender, less than $\frac{1}{16}$ inch in diameter.

The scalelike leaves are paired or opposite, blunt-pointed, in 4 rows covering the twigs and shedding with them.

Male and female cones are borne on the same tree (monoecious), the male elliptic, more than $\frac{1}{8}$ inch long, yellowish. Mature cones short-stalked, woody, composed of 8–14 flat cone-scales irregularly 5- or 6-sided, with a short point or knob in center. Seeds 8–20 on each cone-scale, $\frac{1}{8}$–$\frac{3}{16}$ inch long, brown, slightly winged. Cones not observed in Puerto Rico.

Italian cypress is uncommonly cultivated as an ornamental in yards in Puerto Rico from the coast to high altitudes and in the Virgin Islands. It is common in the mountains near Jayuya.

This classical cypress of the ancient Greeks and Romans is conspicuous in formal gardens and cemeteries of southern Europe. It is hardy in subtropical and warm temperature climates such as southern continental United States from Florida to Arizona and California. Because of its narrow shape, it is used for borders as well as formal planting. Hedges can be formed by clipping.

PUBLIC FOREST.—Maricao.

RANGE.—Native in the eastern Mediterranean region of southern Europe in Syria, Cilicia, Greece, and the islands of Rhodes, Crete, and Cyprus and in the mountains of northern Iran in western Asia.

OTHER COMMON NAME.—ciprés (Spanish).

262. Ciprés italiano, Italian cypress *Cupressus sempervirens* L.*

Leafy twig (above), twig with cones (lower right), natural size.

263. Tuya, oriental arborvitae ***Thuja orientalis* L.**

Oriental arborvitae is a popular shrub or small tree planted around city homes in Puerto Rico. This conifer is recognized by: (1) the regular compact rounded to broad conical form, with lowest branches persistent to the ground, the leafy twigs branching on edge and flattened in vertical fanlike or fernlike sprays; (2) the minute scalelike leaves mostly 1/16 inch or less in length, dull green; and (3) egg-shaped cones, about 5/8 inch long, whitish or bluish but becoming dark brown, with usually 6 cone-scales ending in a hooked point.

An evergreen shrub or small bushy tree 15–25 feet high, often with several trunks to 6 inches in diameter, much branched, with dense symmetrical crown becoming thin and irregular at maturity, resinous and aromatic. Bark brown to dark reddish brown, finely fissured, fibrous and becoming shreddy. Inner bark whitish, fibrous, with slightly resinous taste. Branches brown, slender, becoming slightly rough, resinous.

The leafy twigs are flattened in vertical plane, branching in 2 rows and forming fanlike or fernlike sprays. Leaves paired or opposite in 4 rows in flattened arrangement 1/4 inch wide, scalelike, short-pointed and pressed against twig, with gland dot on back, those on leading twigs to 1/8 inch long, narrow, and spreading.

Cones are borne at ends of short twigs, composed of usually 6 paired hard cone-scales 3/8 inch or less in length and ending in a hooked point, opening at maturity. The lower cone-scales bear 2 oblong wingless seeds 1/8 inch long, naked and shedding upon opening. Old open cones remain on the tree at least a few months. Pollen is produced in small yellowish male cones 3/16 inch long on different twigs of the same plant (monoecious).

The sapwood is whitish and the heartwood dark brown. The wood is described as aromatic, soft, lightweight, and fine-textured.

In recent years this species has been planted widely about city homes in moist areas of Puerto Rico and the Virgin Islands from sea level to high altitudes. Easily transplanted, shallow-rooted, and adapted to moist soils.

Hardy also in warm temperate areas, oriental arborvitae has been planted for ornament in Europe, Asia, and eastern and southern continental United States. In Florida it has spread from cultivation though has not become extensively naturalized. Planted southward to Brazil, Argentina, and Chile. Many horticultural varieties of different shape and color of foliage, sometimes golden, are grown in parks and gardens. The plants can be used as living fences and trimmed as hedges also. Growth responds to fertilizer.

RANGE.—Native of northern China and Korea.

OTHER COMMON NAMES.—tuya (Puerto Rico Spanish); incienso (Guatemala); ciprés, ciprés romano (El Salvador); árbol de vida, pinillo (Dominican Republic); oriental arborvitae (United States); Chinese arborvitae, Asiatic arborvitae (English).

BOTANICAL SYNONYM.—*Biota orientalis* (L.) Endl.

263. Tuya, oriental arborvitae *Thuja orientalis* L.

Twig with cones, natural size.

SCREW-PINE FAMILY (PANDANACEAE*)

Trees and shubs, sometimes woody vines, known by: (1) few stout widely spreading branches with rings; (2) many stiltlike prop roots, also brace roots from branches; (3) many crowded very narrow spiny-margined swordlike leaves spirally arranged at ends of branches; (4) flowers male and female on different plants (dioecious), mostly crowded, small and without calyx or corolla, male flowe on an axis (spike) consisting of many stamer and female flowers in rounded heads compose of colored scales and densely crowded pisti with superior 1-celled ovary, 1 to many ovule short style or none, and stigma; and (5) mu tiple fruit a large ball (syncarp) with mar angled hard many-seeded fruits (drupes).

264. Pandano, screw-pine — *Pandanus utilis* Bory

A few species of screw-pine have been introduced but are infrequent. These curious palmlike ornamentals are easily recognized by: (1) the few stout widely spreading branches with rings; (2) many stiltlike prop roots or brace roots from the branches to the ground; (3) many crowded swordlike leaves spirally arranged at ends of branches, stiff, hard, and leathery, bordered by sharp spines; and (4) fruit a large hard heavy ball 6–8 inches in diameter, with many protuberances, somewhat like a pine cone or pineapple. This species has the leaves about 3 feet in length and 1½–3 inches wide.

Small evergreen ornamental tree to 30 feet high, with trunk to 10 inches in diameter, the few large branches covered by old leaf bases ending in clusters of erect to spreading leaves. The light gray trunk has irregular ring scars from fallen leaves. Prop roots are 1–3 inches in diameter, light brown.

Leaves alternate but crowded, without petiole but with broad clasping base, long and narrow, ending in a long tapering drooping point. The upper surface is shiny green with broad groove and a ridge on each side of midvein and many inconspicuous parallel side veins, the lower surface dull light green with midvein slightly spiny. Dead brown leaves hang down and gradually fall away.

Flowers are male and female on different plants (dioecious) but seldom produced, small, simple and without calyx and corolla. Male flowers in drooping clusters 1–3 feet long consist of many stamens ⅛–¼ inch long, crowded on threadlike branching stalks along an axis (raceme) with several bracts ending in long very narrow point bordered by sharp spine Female flowers in terminal heads have pisti densely crowded with colored scales. The mu tiple fruit (syncarp) borne singly on a lo stalk, is a large hard heavy ball 6–8 inches diameter, composed of about 100 frui (drupes). Each is 1¼–1½ inches long, a 1–1½ inches wide, angled and slightly flattene shiny light brown, hard and fibrous, 3–8-celle containing several seeds.

Locally common as an ornamental, mostly sea level, and as a windbreak against the sea Puerto Rico, St. Croix, and St. Thomas.

Baskets, mats, and place mats can be ma from the leaves. The starchy fruits are edil when cooked. Suckers formed at base of trun can be used in propagation as well as see Planted in southern Florida for the tropi aspect. In temperate parts of the United Sta the young decorative plants are grown indo in pots.

RANGE.—Native of Madagascar but gro through the tropics.

OTHER COMMON NAMES.—palma de tirabuz (Puerto Rico); palma de tornillo (Spanish common screw-pine (English).

The English common name screw-pine ref to the spirally arranged leaves. The genus screw-pines (*Pandanus*) is represented numerous species in the Old World tropics, es cially Pacific Islands. Besides this species a few others are grown in Puerto Rico. *Pandan pacificus* L. H. Bailey,* from the Pacific Islan has larger shiny green leaves 6 feet or more length and 6 inches wide, with longitudi folds.

264. Pandano, screw-pine *Pandanus utilis* Bory *

Male flowers (upper left), leaf, and single fruit (below), all two-thirds natural size; multiple fruit (lower right), about one-third natural size.

GRASS FAMILY (GRAMINEAE)

Grasses are annual and perennial herbs, except for bamboos, which are woody shrubs or vines, sometimes reaching tree size. Known by: (1) jointed stems with enlarged rings at nodes, commonly hollow except at nodes, not increasing in diameter; (2) leaves alternate in 2 rows, composed of a sheath, which surrounds the stem, a scale (ligule), and the blade, generally narrow and parallel-veined, mostly ending in long point, not toothed at edges; (3) specialized mostly greenish or straw-colored flowers (florets) grouped along an axis in cluster (spikelets), generally bisexual, regular, com posed of 2 greenish scales (glumes, lemma an palea) at base, no calyx or corolla, 3 stamens o in bamboos 6 stamens, and pistil with superic 1-celled ovary with 1 ovule and 2 feather styles; and (4) fruit a grain, a dry and seeded. Vol. 1, p. 32.

One species: 3. Bambú, common bambo *Bambusa vulgaris* Schrad.*

PALM FAMILY (PALMAE)

Trees and shrubs, sometimes vines, evergreen, known by: (1) trunk stout or sometimes slender, unbranched, not divided into bark and wood and not increasing in diameter, often with ring scars and sometimes spiny, with hard thick outer layer or rind and bundles of woody tissue scattered in large pith; (2) large spreading leaves alternate and crowded at apex of trunk, with stout hard petiole often forming sheath around trunk, and blades of 2 types, pinnate with many narrow leaflets with many fine parallel veins along the axis and fanlike or palmate-veined, thick and leathery; (3) lar branched flower clusters (panicles) developi from a large bract (spathe) among the le bases or below; (4) many small stalkless short-stalked flowers generally whitish, co monly male and female on the same pla (monoecious) or bisexual, regular, compos of calyx of 3 sepals or lobes, corolla of 3 pet or lobes, stamens mostly 6 and separate, som times many, and pistil with 1–3-celled ova and 1–3 ovules; and (5) fruit mostly a 1-seed berry or drupe. Also vol. 1, p. 34.

Key to species

A. Leaves pinnate.
  B. Spines on trunk and leaf axes.
    C. Leaflets long-pointed; fruits yellowish, 1⅜ inches in diameter; trunk stout—4. Corozo, prickly palm, Puerto Rico acrocomia, *Acrocomia media* O. F. Cook.
    CC. Leaflets ending in a broad jagged edge as if torn; fruits red, ½–⅝ inch in diameter; trunk slender—5. Palma de coyor, *Aiphanes acanthophylla* (Mart.) Burret.
  BB. Spines absent.
    D. Leaf sheaths not forming long tubular base or column.
      E. Leaves 12–20 feet long; fruit the familiar large edible coconut—6. Palma de coco, coconut, *Cocos nucifera* L.*
      EE. Leaves 5–7 feet long; fruits about ½ inch in diameter.
        F. Leaflets erect to arching in 2 overlapping rows on each side of axis; fruit red—8. Palma de lluvia, *Gaussia attenuata* (O. F. Cook) Beccari.
        FF. Leaflets spreading flat along axis and not overlapping.
          G. Leaflets 20–36 inches long and 1¼–2 inches wide; fruit black with 1 seed—7. Palma de sierra, sierra palm, *Prestoea montana* (R. Grah.) Nichols. (*Euterpe globosa*).
          GG. Leaflets to 18 inches long and 1 inch wide; fruit red with 1–3 seeds—268. *Pseudophoenix sargentii.*
    DD. Leaf sheaths closed at base, forming conspicuous column (crownshaft) at apex of trunk.
      H. Leaves 6–8 feet long; trunks many, clustered, slender, less than 5 inches in diameter—266. *Chrysalidocarpus lutescens.*[1]
      HH. Leaves 8–15 feet long; trunks solitary.
        I. Leaf sheaths about 2 feet long; trunks 6–10 inches in diameter—265. *Calyptronoma rivalis.*
        II. Leaf sheaths forming column 4 feet long; trunks stout, 1–2 feet in diameter—*Roystonea.*
          J. Trunk tall, of uniform diameter; fruits dark purple—269. *Roystonea regia.**
          JJ. Trunk enlarged at some distance above base; fruits light brown—9. Palma real, royalpalm, Puerto Rican royalpalm, *Roystonea borinquena* O. F. Cook.

AA. Leaves fan-shaped.
  K. Blades 3–6 feet or more in diameter, with definite midrib; petioles 3–8 feet long; trunk stout, 1–2 feet in diameter—*Sabal.*
    L. Leaves blue green; fruits brown, ⅜–½ inch in diameter—10. Palma de sombrero, Puerto Rico palmetto, *Sabal causiarum* (O. F. Cook) Beccari.
    LL. Leaves green; fruits blackish, ½–¾ inch in diameter—270. *Sabal domingensis.**
  KK. Blades 2–4 feet in diameter, without a midrib, petioles mostly 2–3 feet long; trunk slender, less than 8 inches in diameter.
    M. Petioles not split at base, forming coarse network of fibers; ligule at base of blade rounded; fruits blue-black, juicy, ⅜–½ inch in diameter; seed grooved over surface—267. *Coccothrinax alta.*
    MM. Petioles split at base; ligule at base of blade pointed; fruits white, dry and mealy, about ¼ inch in diameter; seed not grooved on surface—*Thrinax.*
      N. Leaf blades whitish beneath; ligule at base of blade blunt-pointed; flowers and fruits stalkless—271. *Thrinax morrisii.*
      NN. Leaf blades green beneath; ligule at base of blade long-pointed; flowers and fruits stalked—272. *Thrinax multiflora.**

265. Palma manaca, Puerto Rican manac *Calyptronoma rivalis* (O. F. Cook) L. H. Baile

Palma manaca, the rarest of Puerto Rican palms, grows wild only along a marshy stream about 3 miles east of San Sebastián in the northwestern part of the island. It resembles slightly the coconut palm both in trunk and leaves but is smaller. Identification is by: (1) the stout straight smoothish gray trunks 6–10 inches in diameter, not swollen at base, bearing rings but no spines; (2) large pinnate leaves 10–15 feet long, including sheathing base of the stout petiole and many long narrow leaflets 2½–3 feet long, paired or nearly so; (3) numerous small white male and female flowers about ¼ inch long, sunken in many green ropelike axes 8–12 inches long in stalked clusters; and (4) elliptic fleshy fibrous fruits ⅜–½ inch long, containing 1 large rounded seed.

This medium-sized palm becomes 30 feet high. The cylindric trunk is hard, smoothish, slightly fissured, of uniform diameter, bearing horizontal rings of leaf scars mostly 2–4 inches apart. The thin evergreen crown is composed of about 15–20 alternate leaves, erect and spreading to 25 feet across, not drooping. The youngest, unopened vertical leaf forms a narrow vertical shaft or spire.

The leaves have a sheathlike gray-green base of the petiole about 2 feet long, which extends halfway around the trunk, and the stout dull light green petiole continuing 2 feet or more. Blades are divided into leaflets, nearly opposite and about 2 inches apart along a keeled axis. The leaflets are mostly 2½–3 feet long and to 3 inches wide, those on small leaves much smaller, narrowed and oblique at base, bent upward, spreading in 1 plane but drooping on both sides, thick, stiff and leathery, slightly shiny yellow green, hairless, with 10–12 parallel sunken veins, becoming torn between the veins. Dead leaves turn light brown, bend down, and break off at the base, forming a smoothish scar.

One to several flower clusters (panicles) 3–4 feet long, spreading and drooping, arise above the lowest leaves but at maturity are below the lowest remaining leaves. An oblong light green sheath (spathe) 1½ feet long covers the developing flower cluster, and after elongation a second sheath about 2 feet long, boat-shaped, narrowly oblong and light brown, splits open along 1 side. The stout axis (spadix) bears in upper half many green ropelike branches 8–12 inches long and ⅜ inch in diameter, mostly 2–5 on short stalks, sometimes 1.

Flowers are numerous, slightly curved and flattened, white, 2 male and 1 female borne together sunken in a pit of the ropelike axi (monoecious), the male flowers opening first The male flower is more than ¼ inch long, ex tends 3/16 inch above the axis, and is composed o 3 narrow keeled sepals 3/16 inch long; tubula narrow corolla 3/16 inch long in bud, whicl breaks off below middle, forming a cuplik corolla and a cap (calyptra) over the stamens and 6 stamens more than 1/16 inch long spread ing ⅛ inch across from a fleshy curved colum 3/16 inch long. The female flower has calyx of sepals, cuplike corolla with cap, tube with points representing nonfunctioning stamen (staminodes), and pistil with deeply 3-angle ovary and slender style. The numerous ellipti fruits are smooth, rounded at both ends, witl thin outer layer. The seed is rounded. Witl flowers in November and fruits in summer.

This palm is native along a small stream in valley about 3 miles east of San Sebastián along the old carriage road east toward Lares. It wa discovered and named by Orator F. Cook i 1901, during his study of the economic plant of Puerto Rico. This palm is known only from one locality in the moist limestone forest a about 1,000 feet altitude. In 1970 only abou 20 plants of all sizes were seen. It was reporte that a second grove nearby might have bee destroyed by clearing for agriculture.

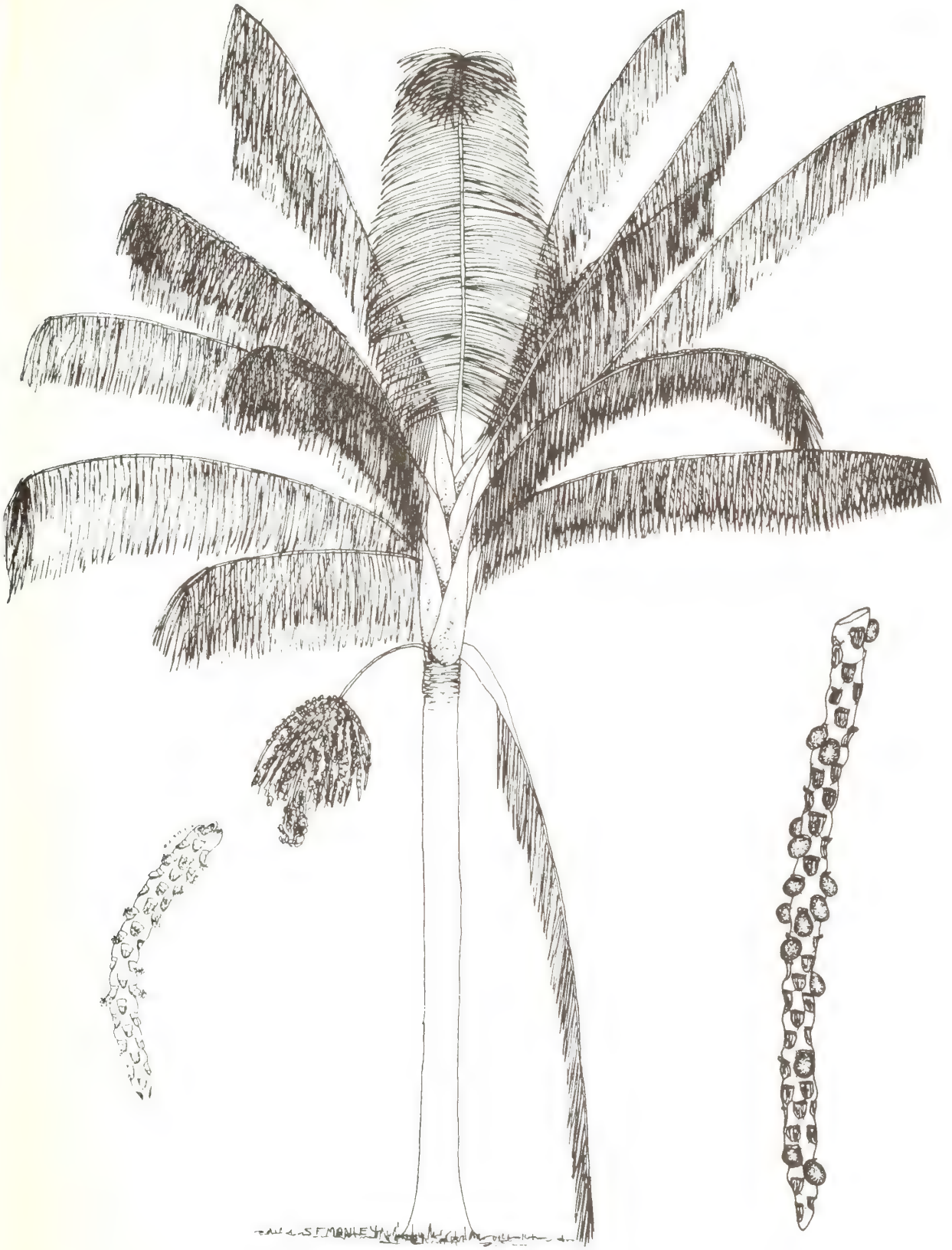
Thus, palma manaca not only is the rares palm but also may be considered endangered be cause it is located on private land. However, th present landowner has expressed an intent t protect the remaining trees. Young plants ar growing in the botanical garden of the Univer sity of Puerto Rico at Lajas from seedlings col lected in 1958.

At one time this palm was included in anothe species (*Calyptrogyne occidentalis* (Sw. Maza), then interpreted as found also in Ja maica, Cuba, and Hispaniola. However, th Puerto Rican palm is now accepted as distinc but with unknown history. Possibly the pal may have been more widespread in the past an now may be nearing extinction. It may hav persisted along this marshy stream, or it migh have been an accidental introduction.

RANGE.—Known only from one locality miles east of San Sebastián in northwester Puerto Rico.

OTHER COMMON NAMES.—palmilla (Puert Rico); manac palm (English).

BOTANICAL SYNONYMS.—*Calyptrogyne riva lis* (O. F. Cook) León, *Cocops rivalis* O. F Cook.



265. Palma manaca, Puerto Rican manac *Calyptronoma rivalis* (O. F. Cook) L. H. Bailey

Flowers (lower left), fruits (lower right), natural size.

266. Palma areca, Madagascar-palm

This small graceful ornamental palm with many crowded stems and feathery green to yellow-green foliage is commonly planted around buildings. It is easily recognized by: (1) the clusters of many slender smooth, spineless ringed trunks resembling bamboo; (2) featherlike pinnate leaves, curved and arching from closed sheath at base, with many narrow paired leaflets, dull green but becoming yellowish before falling; (3) small whitish flowers, male and female, stalkless along a much branched flower stalk attached below the leaves; and (4) long elliptic fruits greenish yellow when immature, becoming violet or blackish, $\frac{5}{8}$–$\frac{3}{4}$ inch long and $\frac{3}{8}$ inch wide, blunt and oblique at apex.

A small palm 10–25 feet high, bushy, spreading and producing additional stems from sprouts or suckers. The slender unbranched trunks are 2–5 inches in diameter, whitish green to green, with rings 2–5 inches apart. Bases become thickened, light gray, and fissured and produce many small brownish prop roots.

The many leaves, including those from sprouts, partly cover the trunks of different lengths. A trunk ends in a column of whitish-green leaf sheaths 1–2 feet long and 6–9 spreading leaves. The unfolded youngest leaf extends as a narrow erect axis. The alternate leaves are mostly 6–8 feet long and 2 feet across, smaller on sprouts, and have a closed sheath 1–1$\frac{1}{2}$ feet long and a slender yellow-green petiole 1–2 feet long and grooved above. The slender keeled yellow-green axis bears as many as 80–100 dull green leaflets, mostly paired or opposite, spreading and slightly curved. These are mostly 1–1$\frac{1}{2}$ feet long and very narrow, $\frac{1}{2}$–$\frac{7}{8}$ inch wide, slightly thickened, gradually narrowed, to a very slender point inconspicuously 2-toothed. The midrib is prominent and raised, and there are few inconspicuous parallel veins. The oldest leaves turn orange yellow toward the end before falling, then leave a smooth ring scar around the trunk.

Chrysalidocarpus lutescens H. Wendl.

The flower clusters (panicles) are 2–3 feet long and much branched. Sheaths (spathes) are like large scales along the axis (spadix). The small whitish flowers are in groups of 2 male and 1 female but different clusters on the same plant may appear to be all of the same sex at one time (monoecious). Male flowers are crowded and stalkless along stout axes, $\frac{3}{16}$ inch wide, composed of 3 rounded yellowish sepals $\frac{1}{16}$ inch long, 3 pointed yellowish petals $\frac{1}{8}$ inch long, stiff and concave, 6 spreading white stamens $\frac{1}{8}$ inch long, and rudimentary pistil. A female flower is usually between 2 male flowers and opening later, consisting of 3 sepals, 3 petals, and pistil with ovary, short style, and broad stigma. The fruits with sepals and petals at base have a thin covering and a long brownish seed of the same shape, hard and whitish within. Flowering and fruits through the year.

Abundant as the most widely planted palm around buildings including homes in Puerto Rico, Culebra, and Vieques, and through the Virgin Islands at all altitudes and in wet and dry areas. This ornamental is easily propagated from sprouts as well as seeds. The flowers attract bees.

Widely grown elsewhere through the tropics. Popular also in continental United States, outdoors in southern Florida, southern Arizona, and southern California and northward indoors in pots and tubs, also in Europe.

RANGE.—Native of Madagascar.

OTHER COMMON NAMES.—areca, palma dorada (Puerto Rico); palma areca (Cuba); eureka (Colombia); Madagascar palm, golden-fruit palm, butterfly palm, red butterfly palm, bamboo palm, yellow palm (English); kekpalm (Dutch Antilles); palmeira bambu (Brazil).

The generic name refers to the resemblance of the spotted fruit to a chrysalis or resting stage of a butterfly, while the specific name, yellow, describes the foliage. Formerly known as *Areca lutescens* Bory. The local common name areca is now a misnomer since the species was removed from that genus.

266. Palma areca, Madagascar-palm *Chrysalidocarpus lutescens* H. Wendl.*

Male flowers and fruits (lower right), natural size.

267. Palma de abanico, tyre-palm — *Coccothrinax alta* (O. F. Cook) Bec

A slender, locally common palm, easily recognized by: (1) fan-shaped leaves with leafstalks 2–3½ feet long, not split at base, forming coarse network of fibers; (2) leaf blades 2½–3½ feet long and broad, without a midrib, deeply split beyond middle into many folded narrow segments dull or shiny light green above and silvery white and minutely scaly beneath; (3) large much branched flower clusters with many short-stalked small flowers ⅛ inch long and broad; and (4) many round blue-black juicy fruits (drupes) ⅜–½ inch in diameter, with 1 round seed grooved over surface.

An evergreen shrub or small tree 10–50 feet tall, with unbranched slender trunk 2–5 inches in diameter, enlarged at base, and at apex with a thin crown of 8–15 leaves. The trunk is gray, smooth to slightly fissured, has faint rings representing scars of fallen leaves, and sometimes is enlarged a few feet above the ground up to 5 inches in diameter.

Leafstalks of the alternate leaves are light green, slightly flattened. The bases of older, dead leaves separate along their edges to form coarse networks of light brown fibers around the trunk. Finally the fallen dead leaves break off, and the trunk below is smooth. The leafstalk joins the blade with an enlarged rounded ligule (hastula) ½–¾ inch long. The fan-shaped blades are composed of many folded leathery segments 15–24 inches long, the folds ½–¾ inch wide, long-pointed or 2–forked with many fine lines of long parallel veins.

The flower cluster (spadix or panicle) 1–1½ feet long attached among the leaves has many slender horizontal branches. Numerous flowers scattered on short stalks of 1/16 inch are composed of white 6-lobed calyx, usually 9 stamens, and pistil with 1-celled ovary and slender style. The calyx is persistent at base of fruit. There 1 round brown seed about 3/16 inch in diamet grooved with curved lines over surface. I corded in flower in May–June.

The foliage has served for thatching hou and for making brooms. This attractive palm not much used as an ornamental, being diffic to transplant and slow growing. However, has been cultivated for its silvery leaves. T fruit may be edible as in related species.

Locally common in moist limestone and no coast forests of Puerto Rico from sea level 1,800 feet altitude, mostly below 1,000 fe Also common on hills through the islands ea ward, including Vieques, Culebra, St. Croix, Thomas, St. John, and Virgin Gorda.

Britton and Wilson (*10;* 5:118) repor that only 1 tree was known on St. Croix by I gers in 1876 and that they could find only 1 1923. The authors in 1954 found apparen the same tree, also 2 old trees in Cotton Val

PUBLIC FORESTS AND PARK.—Cambalac Guajataca, Río Abajo, Susúa, Vega; Virgin lands. This is the common native palm at V gin Islands National Park, where it is scatte from sea level to 1,000 feet altitude.

RANGE.—Puerto Rico and Virgin Islands.

OTHER COMMON NAMES.—palma plate (Puerto Rico); silver-palm, broom teyer, f palm (Virgin Islands); seamberry palm (E lish).

BOTANICAL SYNONYMS.—*Coccothrinax eg siana* Beccari, *C. sancti-thomasae* Beccari, *discreta* Bailey & Moore. The name *C. arge* (Lodd.) Sarg., also applied formerly, refer a species of Hispaniola. Apparently only 1 cies of this genus is native in Puerto Rico the Virgin Islands. Related species of Lesser Antilles may not be distinct.

268. Florida cherrypalm — *Pseudophoenix sargentii* H. We

One small tree 20 feet high and 8 inches in trunk diameter was found on Mona Island in 1970 by one of the authors. Distinguishing characteristics are: (1) trunk slender, slightly swollen at base and in middle and tapering to ends, whitish gray, smoothish, with conspicuous ring scars and no dead leaves; (2) pinnate leaves 4–8 feet long, with gray-green sheath of 6–12 inches, with petiole of 8–20 inches, and many narrow segments to 18 inches long and 1 inch wide, parallel-veined, dark yellow green above and paler beneath, those toward middle longest; (3) many small greenish-yellow flowers ⅜ inch across, mostly bisexual, and few male, consisting of stalk of ⅛–3/16 inch, minute 3-lobed calyx, 3 spreading petals, 6 stamens, and pistil with 3-angled 3-celled ovary an styles, in erect much branched clusters 2 feet long from among the leaves; and many orange-red fruits (drupes) about ⅝ in diameter, with thin flesh and 1 seed 5/16 in diameter, often with 2–3 lobes and 2–3 se

A lone palm of this species was seen in coastal plain forest near sea level at west of Mona Island. Except for a record from minica, this is the eastern limit of range extension of about 40 miles from Saona Is off the southeast coast of Hispaniola. Poss an accidental natural introduction, such as f seed by a bird, or less likely by man. Or the might be the survivor of a nearly extinct col Absent from Puerto Rico and Virgin Isla

267. Palma de abanico, tyre-palm *Coccothrinax alta* (O. F. Cook) Beccari

Immature fruits (lower right), natural size.

RANGE.—Upper Florida Keys (where first discovered and very rare), Bahamas, Cuba, Hispaniola, Mona, and Dominica; also southeastern Mexico and British Honduras. OTHER COMMON NAMES.—cacheo (Dominican Republic); palma de Guinea (Cuba); Florida cherrypalm, Sargent cherrypalm, cherrypalm (United States); hog palmetto, hog-cabbage (Bahamas). The specific name honors the discoverer, Charl Sprague Sargent (1841–1927), United Stat dendrologist and director of the Arnold Art retum of Harvard University. West Indi plants have been distinguished as a variety subspecies (var. *saonae* (O. F. Cook) Read; *P saonae* O. F. Cook).

269. Palma real cubana, Cuban royalpalm ***Roystonea regia*** **(H.B.K.) O. F. Cook**

Cuban royalpalm is planted occasionally in Puerto Rico and the Virgin Islands but much less frequently than the native species, No. 9, Puerto Rican royalpalm (*Roystonea borinquena* O. F. Cook). The introduced species is recognized by its tall stout trunk of uniform diameter either not enlarged above the base or only slightly so. Other distinguishing characteristics are: (1) the gray smooth trunk with horizontal rings; (2) the green column or collar (crownshaft) of leaf sheaths about 4 feet high at apex of trunk; (3) very large pinnate leaves crowded at apex of trunk, forming an umbrella-shaped crown (lower leaves not drooping as in the native species); (4) many small white flowers ¼ inch long on the trunk below the leaves from a narrow cyclindric bud more than 3 feet long; and (5) fruits oblong or rounded, ½ inch long, dull dark purple or reddish brown, 1-seeded.

Medium-sized to tall introduced palm becoming 60 feet in height. The stout trunk about 1½ feet in diameter has many minute short air roots at the enlarged base and is smooth, without spines or old leaf bases, with thick hard outer part. The bud is composed of a narrow vertical growing leaf. At the base of the crown there is often a dead basal leaf hanging down.

The alternate pinnate leaves 10–13 feet long consist of a smooth green sheath that surrounds the trunk like a collar (crownshaft) and the stout grooved axis bearing many stalkless leaflets in irregular double rows on both sides. The narrow (linear) leaflets are more than 2 feet long and about 1 inch (½–1¼ inches) wide and end in a long point divided into 2 unequal points. They are thick and leathery, parallel-veined, hairless, not toothed, and green on both surfaces. The lowest and oldest leaf dies and hangs down from the trunk, finally separating completely and falling, leaving a smooth ring scar. The growing immature leaf is erect like a needle and often curves slightly toward the direction of the wind.

The flowers on the trunk below the leaves d velop within a large narrow brown cylindr sheath (spathe) more than 3 feet long and inches or more in diameter, which opens in parts. The flower cluster (panicle) is a mu branched rounded whitish mass 3 feet or mo in length and width. There are many sm white stalkless flowers along straight slend branches, male and female (monoecious). Ma flowers consist of 3 minute sepals and 3 point petals ¼ inch long united at base, 6–9 spreadi stamens, and rudimentary pistil. The smal female flowers have 3 sepals, tubular coro with 3 pointed lobes and bearing 6 short ster stamens (staminodes) inside, and pistil w ovary and 3 styles. The numerous dry me fruits (like a drupe) are oblong or round with calyx at base. Seed 1, rounded, hard a oily. Flowering and fruiting continuou through the year.

Where this palm is native, the oily seeds ha served to fatten hogs and chickens. Beads ha been made from the seeds. Also, the leaves se for thatch, fencing, and walls. Slabs of luml are cut from the trunks. The flowers attr bees.

This palm is planted for ornament and a street tree in Puerto Rico and the Virgin lands at low altitudes near the coast but is common. Recorded from St. Croix, St. Thom and St. John. Mostly confined to cities but m escape from cultivation. Popular in parks a gardens elsewhere.

RANGE.—Native of Cuba but introduced other tropical regions.

OTHER COMMON NAMES.—palma real (Pue Rico, Spanish); palma de yaguas, palma yagua cubana (Puerto Rico); royalpalm (E lish); konningspalm (Dutch Antilles).

Possibly not distinct from Florida royalpa (*Roystonea elata* (Bartr.) F. Harper), Florida, which has rounded fruits nearly thick as long. Both are planted in south Florida along avenues and for framing la buildings.

269. Palma real cubana, Cuban royalpalm *Roystonea regia* (H.B.K.) O. F. Cook *

Male flowers (lower left), fruits (lower right), natural size.

270. Hispaniola palmetto *Sabal domingensis* Beccar

This species apparently is the ornamental fan-palm introduced on St. Croix and St. Thomas and formerly referred to Bermuda palmetto (*S. bermudana* Bailey, *S. blackburnianum* Glazebrook), of Bermuda, and known also as *S. umbraculifera* (Jacq.) Mart., a rejected name. Characterized by: (1) the stout trunk with petiole bases often persistent nearly to base; (2) large fan-shaped leaves with blades 6–8 feet in diameter, gray green, and petiole as long or longer; (3) flower clusters (panicles) at leaf bases commonly shorter than petioles, much branched and bearing many small whitish flowers 3/16 inch long; and (4) many fruits (drupes) rounded or obovoi ½–¾ inch in diameter. The leaves have serv the same purposes as the native Puerto Ric relative, No. 10, Palma de sombrero or Puer Rico palmetto (*S. causiarum* (O. F. Cook) Be cari). Straw hats have been made from t young leaves, and baskets and mats from t leaf fibers. RANGE.—Native of Hispanio Introduced in Virgin Islands and other islan of West Indies and from Florida to Louisia and California and southward through tropic continental America. OTHER COMMON NAME —cana, palma cana (Dominican Republic).

271. Palma de escoba, brittle thatchpalm *Thrinax morrisii* H. Wen

This small palm of limestone hills and cliffs is distinguished from the other native palms by: (1) fan-shaped leaves with leafstalks 2–3 feet long and split at base; (2) leaf blades 2–4 feet long and broad, without a midrib, deeply split about to middle into many narrow segments which are shiny green above and silvery white scaly beneath; (2) large much branched flower clusters about 3–6 feet long with short drooping branches bearing many very short-stalked small white flowers about ⅛ inch long; and (3) round whitish fruit (drupe) about 3/16 inch in diameter, with 1 round seed smooth and not grooved on surface.

Usually shrubby and less than 15 feet tall, this small palm has unbranched slender smooth trunk 3–6 inches in diameter, columnar or slightly enlarged above. The narrow crown at apex consists of alternate spreading leaves, the upper ones erect and lower ones drooping. The gray trunk is rough with coarse vertical cracks and is covered with old dead leaves at apex and often a mass of fine rootlets at base.

Leafstalks are ½–¾ inch wide, flattened above and obscurely ridged beneath, hairy when young, and pale blue green. When old the leafstalks split in middle and hang against the trunk. The fan-shaped light green blades, hairy beneath when young, have a thick blunt-pointed ligule (hastula) less than 1 inch long and wide at apex of leafstalk, lined with white hairs at least when young. The leathery segments, mostly 2-forked or split at apex, are 1¼–2 inches wide in middle of blade, while those at base are shorter and only ¼ inch wide.

The flower cluster (spadix or panicle) 2–6 feet long is attached among the leaves. Along side branches many long and narrow, boat-shaped sheaths (spathes), leathery and densely scaly, especially toward apex, enclose the young flowers. The slightly fragrant flowers are borne on very short thick disklike stalks. The white cupshaped calyx is ⅛ inch long, with 6 teet the 6 stamens united at base on tube; and oran 1-celled ovary with stout style and funn shaped flat stigma. The fruit contains whiti bitter flesh and 1 rounded shiny dark brov seed nearly 3/16 inch in diameter, smooth a not grooved on surface. Flowering and fruiti seasonally or irregularly.

The wood is hard and lightweight, with sc pith toward center.

Common locally on limestone hills and cliff and often in crevices of bare rock outcro Dry and moist limestone regions of Puerto Ri from sea level to 1,000 feet altitude. Especia common in the dry southwestern areas and al on coastal sands. Also Mona, Muertos, a Vieques. Rare at West End, Anegada, accor ing to Britton and Wilson.

Sometimes planted for ornament in Puer Rico. As the common name indicates, the leav are used in making brooms (also thatch) a have supported local industries.

PUBLIC FORESTS.—Guajataca, Guánica, F Abajo, Susúa, Vega.

RANGE.—Southern Florida including Flori Keys, Bahamas, Cuba, Hispaniola, Mo Puerto Rico, Vieques, Anegada, Anguilla, a Barbuda. Reported also from Mexico (Yucatá and British Honduras.

OTHER COMMON NAMES.—yaray, pandere palma de cojollo (Puerto Rico); guano sierra, miraguano, palmita (Cuba); brit thatchpalm, small-fruited thatchpalm, peaber palm (United States); buffalo-top (Bahamas broom-palm (Anguilla).

BOTANICAL SYNONYMS.—*Thrinax mic carpa* Sarg., *T. ponceana* O. F. Cook.

First collected at Anguilla in 1890 by Dan Morris (1844–1933), British specialist in tr ical economic botany, who worked in Jamai and other islands of the West Indies.

271. Palma de escoba, brittle thatchpalm *Thrinax morrisii* H. Wendl.

Portion of leaf showing base of blade and ligule (above), natural size.

272. Jamaica thatchpalm ***Thrinax multiflora* Mart.***

This closely related small fan-palm has been introduced and planted sparingly as an ornamental in Puerto Rico. It is a small tree to 20 feet high and 4 inches in trunk diameter. Distinguishing characters are: (1) fanlike leaves 3 feet or more in diameter, slightly lighter beneath, divided halfway to center into narrow segments to 1¼ inches wide, with long-pointed ligule (hastula) and leafstalks of 2–3 feet; (2) flower clusters about 3 feet long bearing along side branches many crowded flowers ⅛ inch long on distinct short stalks of 1/16–⅛ inch; and (3) whitish dry round fruits (drupes) ¼ inch in diameter. RANGE.—Hispaniola, Cuba, Jamaica, Bahamas, southern Florida, Mexico, and British Honduras. OTHER COMMON NAMES.—peaberry palm (English); bullhead thatch, sea thatch (Jamaica).

LILY FAMILY (LILIACEAE)

Mostly perennial herbs, often with bulbs or tubers, sometimes shrubs or small trees, known by: (1) the trees and shrubs with stout trunk unbranched or with few branches ending in crowded narrowed pointed leaves; (2) leaves generally alternate, narrow, and entire, parallel-veined; (3) flowers mostly clustered and showy, often large and white, bisexual, regular, composed of 3 sepals and 3 petals nearly equal and mostly separate, mostly 6 stamens separate or attached to corolla, and pistil with mostly 3-celled ovary usually superior, with many ovules, usually 1 style, and 3-lobed stigma; and (4) fruit a capsule or berry with many seeds.

Key to species

A. Leaves slightly thick, soft and curved, 2¼–4 inches wide, with midrib and many fine parallel side veins, ending in long point—273. *Dracaena fragrans.**

AA. Leaves thick, stiff and straight, grooved above, less than 2½ inches wide, without visible veins, ending in long sharp spine or point—*Yucca.*

B. Leaves 1½–2½ feet long, ending in long sharp spine; fruit a capsule 3–3½ inches long—274. *Yucca aloifolia.**

BB. Leaves 2–3 feet long, ending in long weak point; fruit fleshy, to 4 inches long—275. *Yucca gloriosa.**

273. Dracaena ***Dracaena fragrans* Ker.***

This palmlike ornamental seldom flowering in Puerto Rico and the Virgin Islands is characterized by: (1) trunk slender and mostly unbranched; (2) many long lance-shaped or narrowly oblong leaves, parallel-veined, soft, spreading and curved down, crowded at and near top of trunk; (3) many yellowish funnel-shaped flowers about ⅝ inch long crowded in heads or balls of 1½ inches in branched clusters; and (4) many rounded orange berries ½–¾ inch in diameter, with 1 round seed.

An evergreen planted shrub or small tree 15–30 feet high with slender erect trunk 1–4 inches or more in diameter, mostly unbranched or with few erect branches, becoming curved and spreading in age. Trunk and branches light gray, smooth to slightly fissured.

Leaves alternate but crowded, spreading and curved down, 2–3 feet long and 2¼–4 inches wide, with margins straight and parallel, gradually narrowed to clasping base, wider beyond middle, and narrowed into long point at apex, slightly thick and leathery, and hairless. The shiny or dull green upper surface has indistinct grooved midvein and many fine parallel side veins, the lower surface dull light green. Horticultural varieties have stripes and markings of yellow or greenish white.

Flower clusters (panicles) are terminal and branched, 1–2 feet long, bearing heads of many fragrant flowers on stalks of 1/16–⅛ inch. Flowers composed of funnel-shaped yellow calyx about ⅝ inch long with narrow tube and 6 narrow lobes ¼ inch long; no petals; 6 stamens inserted within tube and alternate with lobes and pistil with 3-celled ovary, long threadlike style, and slightly 3-lobed flat stigma. Fruits (berries) many, clustered near ends of branches, round, ½–¾ inch in diameter, green turning orange, with base of style at apex, thin slightly sweet flesh, and 1 rounded yellowish seed nearly ½ inch in diameter.

Abundant as an ornamental shrub or small tree in residential areas at all altitudes in Puerto Rico and the Virgin Islands. Noted from Culebra, Vieques, St. Croix, and St. Thomas. One common variety (var. *massangeana* Hort.) has leaves with a broad yellow stripe along the center. Grown in borders, fences, hedges, and elsewhere also as a windbreak. Propagated vegetatively from cut segments of trunks. Horticultural varieties of this and related species have been grown in Puerto Rico and shipped to florists in continental United States for decorative plants. Also in southern Florida and northward grown as potted plants.

RANGE.—Native of eastern tropical Africa

273. Dracaena *Dracaena fragans* Ker.*

Leaf (left), flowers and fruits (upper right), two-thirds natural size; plant (center right), much reduced.

Widely cultivated through the tropics and becoming naturalized.

OTHER COMMON NAMES.—coco macaco (Dominican Republic), dracaena, fragrant dracaena (English); white rayo (Trinidad); sang-dragon (Guadeloupe).

Shrubs of the closely related genus *Cordyline* are commonly grown for their ornamental foliage around houses and gardens and as fences in Puerto Rico and the Virgin Islands. Most of these plants probably are horticultural varieties of *Cordyline fruticosa* (L.) A. Chev.* (*C. terminalis* (L.) Kunth, *Dracaena terminalis* L.) of tropical Asia. These unbranched shrubs usually 3–8 feet high or treelike have unbranched slender ringed stems. At apex there are many crowded large narrowly oblong leaves 1–1½ feet long and 1–3½ inches wide, curved and parallel-veined, with petiole of 4–6 inches. The leaves have different shades of red and purple. Many varieties are distinguished by shades and patterns of leaf color. The flowers are about ½ inch long, white to reddish, and the fruit a large red berry with several seeds. *Cordyline* is known also by the English common name dracaena and in southern Florida and Hawaii as ti (pronounced tee).

274. Bayoneta, Spanish bayonet, aloe yucca — *Yucca aloifolia* L.*

This ornamental species of yucca or Spanish bayonet is characterized by: (1) stout trunks sometimes branched, to 20 feet high and 4 inches in diameter; (2) long bayonetlike leaves crowded in upper part of trunks, 12–20 inches long and 1–1¾ inches wide, flat, thick and stiff, bordered by minute teeth and ending in a long sharp brown spine, the dead leaves persistent; (3) masses of white flowers 3–4 inches across the 6 spreading fleshy sepals; and (4) fruit an elliptic blackish berry 3–3½ inches long, rarely produced.

Large shrub or small tree, evergreen, with stout erect trunk, often clustered with several sprouts. Upper part covered by crowded dead leaves, which turn light brown and hang downward. Lower part of trunk exposed, brown, becoming fissured or scaly. The trunk has a dark brown outer layer 1/16 inch thick and is soft whitish within, fibrous and almost tasteless.

Leaves alternate, crowded at top of trunks, without petiole, narrowly lanceolate, stiff and thick, grooved or curved above, without visible veins, dull green on both surfaces.

Flower clusters (panicles) 1½–2 feet or more in length, erect, bearing many flowers composed of calyx of 6 spreading blunt-pointed fleshy sepals about 1½ inches long, white or sometimes purple tinged, 6 stamens, and pistil with slightly stalked oblong slightly 3-angled 3-celled ovary and 6-lobed stigma. The nodding fleshy fruits have purplish black pulp without a central core and do not open. Seeds many, rounded, flat, black, about ¼ inch across. Flowers at various times during year, especially spring and summer.

Uncommonly planted in gardens and borders and along roadsides and beaches; coastal plain of Puerto Rico and Virgin Islands, including the larger islands. Tolerant of salt and suitable for planting on coastal sands and dunes. Easily propagated from sprouts. The plants are often decorated by half of an egg shell added to the spiny tip of each leaf. The sharp points can be removed from young leaves with pruning shears.

Sometimes grown as a living fence. It is reported that the flowers of this species have served elsewhere as salad and those of other species eaten fried, also that the fleshy fruits of this and related species are edible.

Pollination of yucca flowers by a particular small whitish moth (*Pronuba*) is necessary for formation of seeds. Thus, seeds normally are not produced outside the natural range.

RANGE.—Native of southeastern United States along the coast mainly in sand dunes, from North Carolina to northern Florida and Louisiana, also in Bermuda, Bahamas, Cuba, and southeastern Mexico. Introduced elsewhere in West Indies and continental tropical America north to southern Arizona and spreading from cultivation.

OTHER COMMON NAMES.—bayoneta (Spanish); espino, flor de Jericó (Dominican Republic); espino, piñón de puñal, maguey silvestre (Cuba); Spanish bayonet, aloe yucca (United States); Spanish dagger (Jamaica); bayonette, pinguin (Haiti); sward-plant (Bahamas).

Several cultivated varieties with colored and striped leaves have been distinguished.

274. Bayoneta, Spanish bayonet, aloe yucca *Yucca aloifolia* L.*

Flowers (above), leaf (right), two-thirds natural size.

275. Bayoneta, Spanish bayonet, bulbstem yucca ***Yucca elephantipes*** **Regel**

This planted Spanish bayonet or yucca is distinguished by: (1) stout trunks sometimes branched, to 20 feet high and 9 inches in diameter, with swollen base; (2) long swordlike or bayonetlike leaves crowded and spreading at end of trunks, 2–3 feet long and mostly 1½–2½ inches wide, concave, slightly thickened and stiff, rough on edges, and ending in a long weak point; (3) showy masses of large white bell-shaped flowers about 3 inches across the 6 spreading fleshy sepals; and (4) oblong whitish fleshy berry fruits to 4 inches long, rarely produced. No. 274, Bayoneta, Spanish bayonet, aloe yucca, *Yucca aloifolia* L.,* has shorter, stiffer, sharp-pointed leaves and the trunk not swollen at base.

Large shrub or small tree, evergreen, with 1 to several trunks, often clustered with sprouts. Trunk gray, rough, fissured, becoming swollen or broad at base. The thin outer layer is slightly bitter, and within is white starchy tissue with taste of raw potato.

The leaves are alternate but crowded, narrowly lanceolate, widest near middle and gradually narrowed toward the stalkless spreading base and toward the weak point, rough on edges with minute teeth, hairless, without visible veins, dull dark green on both surfaces. Older leaves drooping, becoming straw colored and eventually shedding.

The erect terminal flower clusters (panicles) are about 2 feet long and much branched. The many nodding short-stalked flowers are composed of calyx of 6 spreading elliptic blunt-pointed white fleshy sepals about 1½ inches long, 6 white stamens opposite the sepals, an pistil with oblong slightly 3-angled 3-celle ovary, many ovules, short style, and 6-lobe stigma. The fruits have white or yellowis flesh, many flat rounded black seeds nearl ⅜ inch across, and do not split open. Flowe ing in spring.

In Mexico and Central America the youn flowers with pleasant or slightly bitter flav are popular vegetables, for example, eaten frie with eggs, in stews, or raw in salads. The leave can be split into strips like twine and were th source of a fiber for the Indians. The plant have been grown elsewhere in tall hedges an on steep roadside banks for erosion contro Propagated by sprouts, cuttings, and seeds.

Cultivated for ornament in gardens, nea houses, and along roadsides near coasts. Com mon in St. Croix; uncommon in Puerto Ric St. Thomas, and others in Virgin Islands. Pop lar in Florida because the leaf tips are soft ar harmless, not sharp.

PUBLIC FOREST.—Estate Thomas.

RANGE.—Native of Mexico and Centr America and widely distributed in cultivatic north to southern Arizona and south to Cos Rica and Panama. Perhaps spread by th Indians.

OTHER COMMON NAMES.—palmita, palm yuc (Mexico); izote (Central America); pa mera (Guatemala); espadillo (Nicaragua) itabo (Costa Rica); palmito, espinero (Pa ama); Spanish bayonet, Spanish dagger, bul stem yucca, spineless yucca (English).

The scientific name meaning elephant's fo refers to the enlarged base of the stout trun

275. Bayoneta, Spanish bayonet, bulbstem yucca *Yucca elephantipes* Regel

Flowers (upper left), leaf (right), two-thirds natural size.

BANANA FAMILY (MUSACEAE)

Mostly herbs, often large and treelike, rarely palmlike trees with unbranched trunk (*Ravenala*), known by: (1) very large alternate leaves often in 2 rows, entire but becoming torn, with stout midvein and many parallel straight side veins, with base of petiole forming sheath around stem; (2) large flowers in large clusters (mostly spikes or panicles), bisexual or male above and female below in same cluster (monoecious), each above a large lon pointed scale or bract, irregular, composed 3 sepals and 3 petals of unequal size and som times united, stamens 6 or 5 and 1 staminod and pistil with inferior 3-celled ovary with ax placentation and 1 to many ovules in each ce style, and usually 3 stigmas; and (3) fruit 3-celled capsule or long berry, the seeds oft with covering (aril).

276. Arbol del viajero, travelers-tree — *Ravenala madagascariensis* Sonn.

Travelers-tree is a distinctive introduced ornamental easily recognized by: (1) the unbranched, ringed, palmlike trunk; (2) very large, long-stalked bananalike leaves erect and spreading in 2 rows on a single vertical plane like a giant fan; (3) flower clusters shorter than the leaves, with many boatlike scales bearing several large whitish flowers 6–8 inches long; and (4) fruit a brown cylindric hard capsule with many deep blue seeds.

Evergreen palmlike planted tree to 40 feet high, with unbranched trunk 6–12 inches in diameter, smoothish and slightly fissured, light brown, slightly roughened by the narrowed and raised rings about 2 inches apart. Beneath the thin dark brown outer layer is whitish soft tasteless stem tissue.

The crown borne at the upper end of the trunk is an erect giant fan or half circle 10–15 feet or more in height and nearly twice as wide, composed of 20 or fewer large bananalike whitish-green leaves erect and spreading in 2 rows along a vertical plane. At the base of the leaves are concave sheaths about 2 feet long, pressed tightly together, then the stout spreading petioles 3–5 feet or more in length, sometimes to 10 feet. The bananalike oblong blades are 4–7 feet or more in length and 2–2½ feet wide, whitish green and slightly thickened and leathery, with straight margin slightly narrowed from the notched base to the blunt apex. From the stout slightly sunken midrib are many parallel almost straight side veins extending at a right angle. The margin becomes torn into segments along the veins. The oldest, lowest leaves bend and turn yellow to brown, breaking off above the sheath, which gradually weathers away irregularly, finally leaving a smoothish ring scar around the trunk.

The large heavy flower clusters (spikes) are borne singly among the leaf sheaths and project downward about 2 feet or more. Light gre boatlike scales (bracts) 7–9 or more, 1–1 feet long, spread in 2 rows and bear sever large irregular whitish flowers. Each flower composed of 3 narrow stiff sepals 6–8 inch long; 3 separate petals, 1 short and 2 like t sepals forming a sheath; 5 stamens 4–5 inch long; and pistil with inferior 3-celled ova many ovules, slender style, and 3-lobed stigm The hard brown capsule about 3 inches lo and 1¼ inches wide is slightly 3-angled a splits into 3 parts. Seeds many, elliptic, abo ⅜ inch long. With flowers and fruits more less continuously.

The large flowers are adapted to pollinati by birds. While sucking nectar, birds cause t stamens to spring open from the petals a scatter the pollen on feathers for a ride another flower.

Travelers-tree is occasionally planted f ornament and in gardens chiefly in the mo lowlands of Puerto Rico, and in moist are through the tropics including Florida a southern California. Propagated by seeds a divisions.

The leaf sheaths or bases contain cle watery sap, which can be extracted and dru by puncturing a hole near the base with a kni This source of water for travelers is said to the origin of the name. Any persons planni excursions into the forests of the island Madagascar, where this tree grows wild, m wish to remember this drink. It is reported t the blue covering of the seeds is edible.

RANGE.—Native of Madagascar. Wid planted for ornament through the moist tr ics.

OTHER COMMON NAMES.—árbol del viaje palma de viajero (Puerto Rico, Spanish palma de abanico (Dominican Republi waaierpalm, waaierpisang (Dutch Antilles)

276. Arbol del viajero, travelers-tree *Ravenala madagascariensis* Sonn.*

Tree with fruits (much reduced).

CASUARINA FAMILY (CASUARINACEAE*)

Trees and shrubs, known by: (1) many drooping green very slender twigs like pine needles or wires, with longitudinal lines and many jointed nodes; (2) minute scalelike leaves 4–16 in a whorl forming a sheath and ring; (3) many minute crowded dark red flowers, male and female on the same plant (monoecious) or different plants (dioecious), regular, without calyx and corolla, the male whorled along an axis (spike) and composed of 1 stamen and 2 minute scales, and the female in small balls composed of pistil, 2 minute scales, and superior 1(2)-celled ovary with 2 ovules and 2 long styles; and (4) multiple fruit like a ball or cone, hard and woody with many minute winged seeds. Also vol. 1, p. 48.

Key to species

A. Twigs mostly 3–7 inches long, very slender, somewhat less than 1/32 inch in diameter; scale leaves 8–10 in a ring; conelike fruits about 3/8 inch in diameter—278. *Casuarina cunninghamiana.**

AA. Twigs more than 9 inches long, slender, about 1/32 inch in diameter; conelike fruits more than 1/2 inch in diameter.

B. Scale leaves 6–8 in a ring; conelike fruits 1/2–3/4 inch in diameter—11. Casuarina, Australian beefwood, horsetail casuarina, *Casuarina equisetifolia* L.*

BB. Scale leaves mostly 12–14 in a ring; conelike fruits 1/2–1 inch in diameter—277. *Casuarina cristata.**

277. Casuarina, scalybark casuarina — *Casuarina cristata* Miq.*

A medium-sized evergreen tree 60 feet high and 1 1/2 feet in trunk diameter with pointed dense crown, distinguished by: (1) blackish scaly rough bark; (2) very long wiry drooping gray-green twigs 9–13 inches long and only 1/32 inch in diameter, jointed and grooved, the nodes about 1/4 inch apart; (3) leaves about 12–14 minute brown scales in a ring (whorled); and (4) many minute light brown flowers, the male crowded in narrow cylindric terminal clusters 5/8–7/8 inch long. The fruits, which are dark reddish brown hard conelike balls 1/2–1 inch in diameter, are not produced in Puerto Rico (or Florida), reportedly because female trees are absent. This native species of Australia has been introduced experimentally in Puerto Rico. The trees grow very fast. In South Florida this species with spreading roots is rated as excellent for windbreaks and screens or barriers against noise and dust, also suitable for shade in large areas. A distinctive feature is the ability to spread by abundant suckers or sprouts from horizontal roots around a tree. These root suckers can be undesirable except in pastures. In Florida, sucker-free plants are produced by grafting upon stocks of No. 11 horsetail casuarina, *Casuarina equisetifolia* L.* OTHER COMMON NAMES.—pino australiano, pino de Australia (Puerto Rico, Spanish); Australian-pine (United States). BOTANICAL SYNONYM.—*Casuarina lepidophloia* F. Muell.

278. Casuarina, Cunningham casuarina — *Casuarina cunninghamiana* Miq.*

This tree resembles a pine because of its thin, pointed crown of needlelike twigs replacing leaves. It is recognized by: (1) long wiry drooping gray-green twigs like pine needles, somewhat less than 1/32 inch in diameter, jointed and grooved; (2) leaves reduced to 8–10 tiny brown scales in a ring; (3) many crowded minute light brown flowers, male in narrow terminal clusters 1/4–3/4 inch long and female lateral in balls of 1/8–1/4 inch on other trees (dioecious); and (4) small brown or gray ball fruits, hard and conelike, about 3/8 inch in diameter, sometimes to 5/8 inch. Distinguished from related species by the smaller cones and very slender wiry twigs.

A medium-sized evergreen tree to 50 feet high with straight trunk 1 foot in diameter and ascending branches. The bark is brown, smoothish but becoming rough and furrowed, the inner bark light brown and slightly bitter. The drooping wirelike twigs are mostly 3– inches long, with joints or rings less than 1/ inch apart, older branches brown and smooth to rough.

The tiny pointed leaves are 8–10 at a node (whorled), less than 1/64 inch long. The wire like twigs remain green and function like leaves in manufacturing food and in shedding gradually. The main twigs 1/16 inch or more in diameter do not shed, turn from pale green to brown and bear larger scale leaves to 1/8 inch long.

The light brown male flower clusters (spikes) are less than 1/8 inch wide. Tiny male flowers crowded in rings within grayish scales consist of 1 exposed brown stamen less than 1/ inch long with 2 minute scalelike brown sepa

278. Casuarina, Cunningham casuarina *Casuarina cunninghamiana* Miq.*

Twig with male flowers (left), twig with female flowers and fruits (right), natural size.

at base. The short-stalked balls of female flowers are more than ¼ inch across the spreading dark red styles. Crowded female flowers within gray scales lack sepals but have a pistil less than ¼ inch long with small ovary and long threadlike dark red style. The conelike multiple fruit is composed of long broad hard points of ⅛ inch, each developed from a flower. The individual fruit nearly ¼ inch long opens in 2 parts at maturity to release 1 light brown winged seed (akene) less than ¼ inch long.

The hard heavy wood is composed of light brown sapwood and reddish brown heartwood.

This species has been tested in Puerto Rico in windbreaks but is suitable also for ornament and shade, having very fast growth. Perhaps better suited to the mountains than the coast. Elsewhere the plants have been pruned as hedges or living fences, also employed in reforestation.

Reported to attain the largest size in the genus in Australia, also the most cold hardy. This species is adapted to subtropical mountains and is planted north to Florida, southern Arizona, and California, in the interior plateaus of Mexico, through the northern Andes, and south to Argentina and Chile. In central and south Florida it is recommended for shade, shelter, and windbreaks but not in cities, because of the large root systems and space needed.

OTHER COMMON NAMES.—pino australiano, pino de Australia (Puerto Rico, Spanish); river-oak casuarina (English); Cunningham Australian-pine, Australian-pine, Australian beefwood (United States); casuarina cavalinha (Brazil).

Casuarina is not related to the true pines, which also have been introduced into Puerto Rico. The wiry drooping twigs like needles obviously are the source of the common names pine and pino.

PEPPER FAMILY (PIPERACEAE)

Shrubs, small trees, also herbs, known by: (1) branches and twigs green with rings and enlarged nodes; (2) leaves mostly alternate simple, entire, pinnate- or palmate-veined, aromatic, with spicy flavor and odor, with stipules united to petiole; (3) minute flowers crowded in fleshy cordlike cluster (spike), yellow or greenish, opposite a leaf, mostly bisexual, regular, without calyx or corolla, with 1–10 stamens and pistil with superior 1-celled ovary containing 1 ovule, style (sometimes none), and 1–5 stigmas; and (4) fruit (drupe or berry) minute and greenish, 1-seeded. Also vol. 1, p. 50.

Key to species

A. Leaves ovate to elliptic, with 5 main veins from base—279. *Piper amalago.*
AA. Leaves elliptic to lanceolate, with 1 midrib.
  B. Leaves elliptic, thin, with sides slightly unequal at base, with long curved side veins.
    C. Leaves with 2 or 3 long curved side veins from near base on each side of midvein; flower cluster erect—280. *Piper blattarum.*
    CC. Leaves with several long curved side veins along midvein; flower cluster curved—12. Higuillo, *Piper aduncum* L.
  BB. Leaves lanceolate, thick and stiff, oblique and with very unequal sides at base, with several short nearly straight side veins—281. *Piper tuberculatum.*

279. Higuillo de limón — *Piper amalago* L.

This common species is recognized as an higuillo or pepper by the enlarged, ringed joints (nodes), the tiny flowers and fruits crowded in cordlike lateral axes (spikes) opposite the leaf bases, and the peppery taste and pungent or disagreeable odor of leaves, fruits, and seeds. Distinguishing characteristics of this species include: (1) the leaves ovate to elliptic, palmate-veined with 5 main veins from the rounded, slightly unequal base; (2) the cordlike flower clusters nearly straight, erect, 2–3½ inches long, of minute flowers not borne in rings or spirals; and (3) the distinct egg-shaped fruits about 1/16 inch long.

An evergreen shrub, sometimes becoming treelike and 18 feet high. The trunk to 3 inches in diameter is green and smooth, with many dotlike brown warts (lenticels). The twigs are green, slightly zigzag, finely hairy with enlarged ringed joints (nodes).

The leaves are alternate in 2 rows and with finely hairy green petioles about ½ inch long. Blades are 3–6 inches long, 1½–3½ inches wide, thin, long-pointed at apex, not toothed on borders, with minute gland dots visible under a lens against the light, the upper surface slightly shiny green to dark green, hairless, and with slightly sunken veins, the lower

279. Higuillo de limón *Piper amalago* L.

Natural size.

surface dull light green and minutely hairy on veins.

The nearly straight erect flower clusters (spikes) are borne singly opposite a leaf, light yellow, and more than 1/16 inch in diameter. The very many minute flowers, each less than 1/32 inch long, consist of 6 or fewer stamens, pistil with 3 stigmas, and 1 greenish-yellow hairy scale (bract). Fruits (drupes) are crowded but distinct, pointed with stigmas at apex, and contain 1 seed. Flowering and fruiting throughout the year.

Elsewhere the leaves and flower clusters are used in folk medicine.

Common in openings and thickets, lower Cordillera, lower Luquillo, and moist limestone forests from sea level to 2,000 feet altitude in Puerto Rico. Also in Vieques, St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC FORESTS AND PARK.—Cambalache, Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro, Vega; Virgin Islands.

RANGE.—Greater Antilles and through Lesser Antilles to Barbados and Trinidad. Also from Mexico and British Honduras to Costa Rica.

OTHER COMMON NAMES.—higuillo oloroso (Puerto Rico); guayuyo (Dominican Republic); cordoncillo (Mexico, Central America); anisillo (Nicaragua); alcotán (Costa Rica); cirio, anisette (Haiti); malimbé (Guadeloupe, Martinique).

BOTANICAL SYNONYM.—*Piper medium* Jacq.

280. Higuillo — *Piper blattarum* Spreng.

Like the others of the genus, this uncommon species confined to Puerto Rico has enlarged ringed joints (nodes), tiny flowers and fruits in cordlike lateral axes at leaf bases, and the peppery taste and odor of leaves, fruits, and seeds. This species is recognized by: (1) numerous wartlike dots on the stems; (2) the pleasantly aromatic leaves elliptic, short-pointed at both ends, and pinnate-veined with 2 or 3 long, curved lateral veins on each side of midrib; (3) the cordlike flower clusters slender, curved, 3–6 inches long, whitish but becoming light green, the minute flowers scattered and not borne in rings or spirals; and (4) the distinct orange rounded fruits about 1/16 inch in diameter.

Evergreen shrub, sometimes becoming a small tree 15 feet or more in height (recorded to 25 feet) and 3 inches in trunk diameter. The bark is light brownish gray, smooth with many minute dotlike warts (lenticels). The light grown inner bark has a spicy odor and taste. Twigs are light green, turning to light brown, hairless or sometimes slightly hairy, with raised brown dots (lenticels).

The leaves are alternate in 2 rows, hairless, with light green petioles 1/4–3/8 inch long. Blades are 3–5 1/2 inches long and 1 1/4–3 1/2 inches wide, thin, not toothed on borders, with minute gland dots visible under a lens against the light, the upper surface shiny green to dark green with sunken veins, the lower surface light green and slightly shiny, with prominent veins.

The slender, curved flower clusters (spikes) are borne singly opposite a leaf, the axis whitish and more than 1/8 inch across the stamens. The minute fragrant whitish flowers less than 1/16 inch across consist of 3–5 stamens, pistil with 2–4 (usually 3) stigmas, and 1 minute whitish scale (bract). After flowering the axis and developing fruits turn light green. The rounded fruits (drupes) are broader than long, retain stigmas at apex, and have 1 seed. Flowering and fruiting continuously.

The wood is light brown and hard.

Uncommon in upper Cordillera and upper Luquillo forests, also rare in moist limestone forest, at 1,000–3,500 feet altitude in Puerto Rico. Abundant in Maricao Forest. Recorded also from St. Thomas nearly a century ago.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Toro Negro.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAME.—higuillo oloroso (Puerto Rico).

The odd specific name, meaning "of the roaches," refers to a note by the discoverer, Carlo Guiseppe Bertero, that the plant was infested with those insects.

280. Higuillo *Piper blattarum* Spreng.

Natural size.

281. Higuillo ***Piper tuberculatum* Jacq.**

From the other tree species of higuillo or pepper, this rare species is distinguished by: (1) numerous wartlike dots on the stems; (2) the aromatic narrowly ovate or lanceolate leaves, thick, stiff, dull green with sunken veins, almost stalkless, with oblique base ¼–½ inch or more shorter on one side; (3) the cordlike flower clusters straight and erect, 4–5 inches long and ⅛ inch in diameter, the minute gray-green flowers crowded in regular rings; and (4) the fruit clusters becoming yellow green and more than 3/16 inch in diameter.

An evergreen shrub of 5–10 feet, sometimes vinelike or becoming treelike and 15 feet high and 3 inches in trunk diameter. The bark is gray with prominent raised dots (lenticels), the inner bark light yellow, turning reddish, with spicy bitter taste. The twigs are finely hairy, light green when young, becoming gray with raised dots (lenticels), with enlarged ringed joints (nodes), slightly zigzag. The bud or growing point is enclosed inside the base of the last leaf.

The leaves are alternate in 2 rows, almost stalkless. The odd rounded base of the blade is unequal, extending almost to the twig on one side and ¼–½ inch or more shorter on the other, with grooved split midrib like a petiole. Blades are 3½–5 inches long and 1¼–2 inches wide, long-pointed at apex, turned up slightly from midrib, with edges slightly turned under, the upper surface dull green and nearly hairless, with midrib and the several short lateral veins slightly sunken, and the lower surface dull light green, finely hairy, with raised veins. Crushed leaves are aromatic and have a spicy taste.

Flower clusters (spikes) are borne singly opposite a leaf. The rounded fruits (drupes) 1/16 inch in diameter are borne crowded in rings. Flowering and fruiting continuously.

The light brown wood is soft.

Elsewhere the plants are grown in hedges, propagated by cuttings and becoming dense where trimmed. Also, the fruit has served as a substitute for pepper.

Rare in moist limestone forest at 800–2,500 feet altitude in Puerto Rico.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, Guadeloupe, and Trinidad and Tobago. Also widespread from Mexico and British Honduras to Guianas, Brazil, Peru, and Ecuador.

OTHER COMMON NAMES.—cordoncillo (Spanish); cordoncillo negro (Guatemala); cordoncillo blanco, chile cordoncillo (El Salvador); guisanillo (Panama); pimienta (Colombia); guayuyo (Dominican Republic); Spanish-elder (British Honduras); pimienta longa, pimienta de Macao (Brazil).

The specific name refers to the tubercles or warts on the twigs and branches.

CHORANTHUS FAMILY (CHLORANTHACEAE)

Small trees, shrubs, and herbs, known by: (1) green fragile twigs, 4-angled with rings at the enlarged nodes and with large pith; (2) leaves (and other parts) aromatic when crushed, opposite, simple, somewhat thick and succulent, toothed, hairless, the petioles and stipules joined into a sheath and ring; (3) flowers male and female on different plants (dioecious; sometimes bisexual), minute, greenish, regular, the many male flowers crowded in conelike clusters (spikes) with 1 stamen and no calyx or corolla, and the few female flowers in groups of 2–3 together enclosed by 3 whitish fleshy scales, the pistil with inferior 1-celled ovary containing 1 ovule, stigma or also style, and 3-toothed calyx above; and (4) 2 or 3 whitish juicy fruits (drupes) enclosed by 3 fleshy scales. Vol. 1, p. 52.

One species: 13. Azafrán, *Hedyosmum arborescens* Sw.

281. Higuillo *Piper tuberculatum* Jacq.

Fruiting twig (left), flowering twig (right), natural size.

Trees and shrubs known by: (1) plants deciduous, often aromatic; (2) leaves alternate, simple, mostly toothed, with stipules; (3) minute flowers male and female on different plants (dioecious), regular, crowded along an axis (spike), each above a scale, the male flower with cuplike disk or 1–2 glands and 1–40 stamens separate or united at base, and the femal flower with pistil with superior 1–celled ovar 2–4 parietal placentas and many ovules, styl and 2–4 stigmas; and (4) fruit a capsule oper ing in 2–4 parts, containing many minute seed with cottony hairs. Also vol. 1, p. 54.

Key to species

A. Leaves dull green on both surfaces, with inconspicuous side veins and broad stipules; crown narrow, wit nearly erect branches—14. Sauce, Humboldt willow, *Salix humboldtiana* Willd.*

AA. Leaves gray green on lower surface, with visible side veins and narrow stipules; crown broad, with long droo ing branches—282. *Salix babylonica.**

282. Sauce llorón, weeping willow ***Salix babylonica* L.**

Weeping willow is an introduced tree sometimes planted as an ornamental. It is distinguished by: (1) broad open irregular crown of spreading branches; (2) numerous very long, very slender drooping or "weeping" vertical yellowish green to brownish twigs; and (3) very narrow long-pointed, finely saw-toothed leaves gray green on lower surface, hanging down vertically from short petioles.

A small to medium-sized evergreen or deciduous tree becoming 30–40 feet high and 1½ feet in trunk diameter, with crown nearly as broad as the height. The bark is thick, rough, and gray, deeply furrowed into long branching ridges and exposing rusty-colored inner layers. Inner bark whitish, fibrous, and bitter. The branches are smooth and greenish. Twigs hang down vertically 3–8 feet or more, mostly unbranched, being too slender and too weak to support themselves, with minute hairs when young but soon hairless. Buds at leaf bases, oblong, ⅛ inch long, light green, covered by a single scale, finely hairy.

Leaves alternate, with short slender petioles ⅛–¼ inch long, yellow green, finely hairy when young, sometimes with paired narrow greenish scales (stipules) at base. Blades very narrow, linear-lanceolate, 2½–5 inches long and ¼–½ inch wide, thin, hairless, very long-pointed at both ends, with light yellow midvein and side veins fine and inconspicuous, the upper surface dull green, and the lower surface gray green. Willow foliage has a slight but distinctive odor, especially when crushed.

This species may not bear flowers in Puerto Rico. Flowers are male and female on differen trees (dioecious), in scaly, greenish cluste (catkins) ⅝–1¼ inches long at the end of sho side twigs. Male flowers consist of 2 stamen above a slightly hairy scale, and female flowe with scale at base have a pistil composed of celled ovary and 2 stigmas, each 2-lobed. Se capsules about 3/16 inch long contain many sma seeds with tufts of cottony hairs.

The sapwood is whitish and soft.

Weeping willow is a handsome ornament widely planted in temperate regions as lawn and landscape tree especially near wate Easily propagated from stem cuttings and fa growing. The trees, like other willows, a adapted to moist soil, and the roots may inva sewers and cause damage. Thus, planting ne water pipes is not recommended. The branch are weak and brittle and easily broken strong winds.

Planted as an ornamental, such as in cem teries, parks, and gardens, and near water. R ported as escaping from cultivation near May guez, but not persisting.

RANGE.—Native of China. Widely plant in mild temperate regions from United Stat south to Argentina, also in Eurasia, escapi from cultivation and becoming naturalized.

OTHER COMMON NAMES—sauce llorón (Spa ish); weeping willow (English, Unit States); Babylon weeping willow (Unit States).

The scientific name referring to Babylon misleading, though the tree may have be introduced there by early traders.

282. Sauce llorón, weeping willow *Salix babylonica* L.*

Leafy twig, natural size.

Small trees and shrubs, known by: (1) alternate simple leaves often oblanceolate, toothed, and leathery, with orange or yellow resinous dots, very aromatic when crushed, mostly without stipules; (2) minute greenish or yellowish flowers, mostly male and female on the same plant (monoecious) or different plants (dioecious), in short lateral clusters (spikes), regular, without calyx or corolla, ea above a scale, the male flower mostly with 4 (2–20) stamens sometimes united, and the 1 male flower with pistil composed of superi 1-celled ovary with 1 ovule and 2-forked styl and (3) fruit (drupe) small rounded whitis covered with wax, 1-seeded.

Key to species

A. Leaves 1½–2½ inches long, oblanceolate, coarsely toothed above middle, slightly thickened—283. *Myrica ce fera.*

AA. Leaves ½–1¼ inches long, spoon-shaped, finely toothed near apex, thick and stiff with edges much curv under—284. *Myrica holdridgeana.*

283. Cerero, southern bayberry ***Myrica cerifera***

Cerero or southern bayberry is easily recognized by its distinctive slightly aromatic leaves and waxy fruits. It main characters for identification are: (1) small oblanceolate coarsely-toothed yellow-green leaves nearly covered with minute gland dots visible with a lens, the dots dark brown on upper surface and orange on lower surface; (2) flowers minute in yellow-green clusters at leaf bases; and (3) small round fruits ⅛ inch in diameter, covered with bluish-white wax, on female trees.

Evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter. Bark gray smooth, the inner bark light brown and slightly bitter. The slender dark brown twigs are covered when young with reddish hairs and orange gland dots, and bear raised whitish dots (lenticels).

The alternate leaves without stipules are 1½–2½ inches long and ½–¾ inch wide, oblanceolate, coarsely toothed above middle toward the short-pointed apex and gradually narrowed to the wedge-shaped base and short slender leafstalk less than ¼ inch long, slightly thickened and stiff, shiny dark green above and paler beneath.

Flower clusters (spikes) at leaf bases are narrowly cylindric in shape and bear minute flowers without calyx and corolla, male and female on different plants (dioecious). Male flower clusters ¼–¾ inch long have many male flowers about 1/16 inch long consisting of 4–6 stamens above a scale. Female flowers in shorter clusters are composed of scale and pistil with 1–celled 1–ovuled ovary and 2 long styles. The fruits (drupes), several at a leaf base, are light green but covered with wax, 1–seeded. With flowers in spring and fall and fruits in early summer.

The wood is whitish and slightly hard.

Elsewhere the wax from the berries is separated in boiling water and made into candles, which burn with a fragrance. Both the Spanish and scientific names mean wax bearer. Classed as a honey plant. Formerly, candles were made from the wax in Puerto Rico, according to Co and Collins (*13*, p. 200–201). The dried ba of the root has been used in medicine.

In Florida recommended as one of the b native shrubs or small trees for screens, hedg landscaping, and wildlife. Propagated by cuttings, layering, and seed and of medi growth rate. Adapted to wet and dry soils, a cold hardy and salt tolerant.

Uncommon and local in moist coastal for (siliceous sands and Laguna Tortuguero) a moist limestone forest from sea level to 3,0 feet altitude in the western upper Cordill forest of Puerto Rico.

PUBLIC FORESTS.—Maricao, Río Abajo.

RANGE.—Bermuda, Bahamas, Cuba, Jamai Hispaniola, and Puerto Rico. Coastal plain southeastern continental United States fr New Jersey to Florida and Texas. Also fr Mexico and British Honduras south to Co Rica.

OTHER COMMON NAMES.—arrayán (Pue Rico, Spanish); árbol de cera (Dominican public, Mexico); arraiján (Cuba); cera veg (Central America); bayberry, candle-be waxmyrtle, southern waxmyrtle (Uni States); waxberry, waxwood (Jamaica); t bark, tea-box, myrtle (British Honduras).

BOTANICAL SYNONYM.—*Myrica mexic* Willd.

Southern bayberry is one of the very Puerto Rican tree species native also in so eastern continental United States in tempe climates north of Florida. This species gr wild along the Atlantic coast to southern N Jersey, probably the farthest north of any tive Puerto Rican tree. Thus, it apparentl the hardiest to cold weather and freezing t perates. Perhaps this species merits rec mendation in response to requests for a tre represent Puerto Rico in parks and gar northward on the continent. Found on var islands of the West Indies, this species parently reaches its southeastern limit Puerto Rico.

283. Cerero, southern bayberry *Myrica cerifera* L.

Twigs with male flowers (above), fruits (lower left), twig with female flowers (lower right), natural size.

284. Palo de cera ***Myrica holdridgeana*** **Lundel**

A rare shrub or small tree known only from Luquillo Mountains, identified by: (1) small thick leaves, shaped like an inverted spoon, convex and much curved under at edges, the paler lower surface with many minute orange gland dots visible with a lens; and (2) flowers minute in yellowish or greenish clusters at leaf bases, male and female on different plants.

Evergreen shrub or small tree to 18 feet high and 4 inches in trunk diameter, generally a compact much branched shrub of 5–8 feet. The light gray bark is slightly fissured and warty, the inner bark light brown and bitter. The short slender twigs are covered when young with hairs and orange gland dots.

The alternate often crowded leaves without stipules have slender short, hairy leafstalks about 1/8 inch long. The spoon-shaped (spatulate) blades are 1/2–1 1/4 inches long and 1/4–5/8 inch wide, rounded and finely toothed at apex, gradually narrowed to wedge-shaped base, thick and stiff, with edges much curved under, slightly hairy on veins. The midvein and the few short side veins are much sunken on the slightly shiny dark green upper surface and raised on the paler lower surface, which is nearly covered with minute orange gland dots.

Flower clusters (spikes) at leaf bases bear minute flowers without calyx or corolla, mal and female on different plants (dioecious), th male flower clusters 1/4–5/8 inch long and les than 1/8 inch wide. Many male flowers abou 1/16 inch long consist of 2–4 stamens above greenish scale. Female flowers several in greenish scaly and hairy ball 1/16 inch in diam eter, each with rounded ovary less than 1/3 inch long and 2 spreading dark red styles 1/1 inch long. Flowering in spring. Fruits nc seen, probably in summer.

Wood light brown, hard.

Rare and local in upper Luquillo fores (colorado type) and dwarf forest of ridges c peaks in Luquillo Mountains at altitudes c 2,500–3,000 feet and above.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquillo Mour tains of Puerto Rico.

This species was named in 1942 for Leslie H Holdridge, who collected it in 1939, whil making extensive collections of Puerto Rica trees for the United States Forest Service. H authored "Trees of Puerto Rico" (*30, 31*) forerunner of the present reference. An earlie specimen identified later was by George A. Ge hart, another forester, in 1935.

284. Palo de cera *Myrica holdridgeana* Lundell

Twigs with male flowers, natural size.

Deciduous aromatic trees, known by (1) leaves mostly alternate, odd pinnate, without stipules, leaflets with toothed border and with resin dots beneath; (2) flowers male and female on the same tree (monoecious), minute, greenish, the male mostly many in drooping scaly clusters (spikes), composed of 3 bracts, 4 or fewer sepals, no corolla, and with 3–40 or more stamens, and the female flowers few in short erect clusters (spikes) or only 1–2, composed of 3 bracts and 4 or fewer sepals united to the ovary, and pistil with inferior ovary 1-celled (2–4 cells below) with 1 ovule and 2-forked style; and (3) fruit a nut with hard shell often splitting open or sometimes winged, or a drupe with large oily edible seed.

285. Nogal, West Indian walnut ***Juglans jamaicensis*** **C. DC.**

West Indian walnut is one of very few native tree species of Puerto Rico that have not been found here in recent years. It is identified by: (1) large pinnate leaves 12–20 inches long, composed of mostly 16–20 lanceolate, finely toothed, long-pointed leaflets, rounded and unequal at base; (2) flowers small, greenish, male and female in narrow unbranched clusters; and (3) fruit a rounded walnut about 1½ inches in diameter.

Large tree reported to reach 60–70 feet in height, the crushed parts probably with the distinctive odor of walnut. Twigs, leaf axes, and buds with minute rusty hairs.

Leaves alternate, composed of mostly 16–20 (12–22) nearly stalkless leaflets mostly paired. Leaflets 2½–4 inches long and 1–1¾ inches wide, thin, becoming nearly hairless except on veins beneath.

Flowers male and female in different clusters (catkins) on same tree (monoecious). Male flowers many in drooping narrow clusters 4–5 inches long on twigs of previous year, composed of 6–lobed calyx and many stamens. Female flowers several along axis 2–4 inches long at end of twig of new year, about ¼ inch long, finely hairy, composed of a 4-toothed scale opening on 1 side, 4 sepals, and pistil with inferior ovary and 2 spreading feathery styles. Fruit (drupe) a walnut, composed of blackish husk, brown rough-ridged hard shell ¾–1¼ inches in diameter, and 1 large oily edible seed.

The wood is reported to be of good quality like that of other walnuts. Elsewhere the leaves and bark have been used in home remedies. The seeds are edible walnuts.

Botanical specimens of this species of walnut have been collected in the mountains of central Puerto Rico in the region of Arecibo, Utuado, Adjuntas, and Piñuelas at about 2,000 feet altitude. The first collection was probably that of P. Sintenis in 1885 and the last was by Bartolomé Barcela in 1915. The forests of this region have been largely removed and replaced by coffee plantations. Also, the walnut trees, which probably were uncommon or rare, might have been cut for the prized wood. A careful search might be rewarding, as most other rare lost native trees have been rediscovered.

RANGE.—Cuba and Hispaniola. Also collected long ago in Puerto Rico.

OTHER COMMON NAMES.—nuez, palo de nuez (Puerto Rico); nogal (Dominican Republic) nogal del país, nuez (Cuba); West Indian walnut, walnut (English).

BOTANICAL SYNONYM.—*Juglans insularis* Griseb.

This species, the only native walnut in the West Indies, is not in danger of extinction, as it grows wild in both Cuba and Hispaniola. The scientific name is misleading, because this species is not known from Jamaica.

285. Nogal, West Indian walnut *Juglans jamaicensis* C. DC.

Twigs with female flowers (left), leafy twig (right), fruit (below), two-thirds natural size.

Trees and shrubs, sometimes woody vines, known by: (1) leaves alternate in 2 rows, asymmetrical or unequal at base, often with 3 main veins, generally toothed, with paired stipules; (2) minute inconspicuous greenish flowers usually 1 to many lateral, male and female (bisexual in *Ulmus*), with calyx of 4– persistent sepals or lobes, no corolla, 4–8 sta mens opposite sepals, and pistil with superic 1-celled ovary with 1 ovule and 2 styles; an (3) fruit a drupe or winged (samara). Als vol. 1, p. 56.

Key to species

A. Leaves coarsely saw-toothed, becoming hairless or nearly so; fruits single at leaf bases, round or elliptic, 5 inch in diameter, purplish black—286. *Celtis trinervia.*

AA. Leaves finely saw-toothed, with short hairs; fruits clustered at leaf bases, round, ⅛ inch in diameter, pink o orange—*Trema.*

B. Leaves less than 2 inches long, short-pointed, rough hairy on both surfaces—15. Palo de cabrilla, We Indies trema, *Trema lamarckiana* (Roem. & Schult.) Blume.

BB. Leaves 3½–6 inches long, long-pointed, rough hairy above, soft hairy on veins beneath—16. Guacimill false jacocalalu, Florida trema, *Trema micrantha* (L.) Blume.

286. Almez ***Celtis trinervia* Lan**

Almez is easily recognized by its small narrowly ovate leaves alternate in 2 rows with 3 main veins from the very one-sided, oblique, or unequal base, tapering into a long narrow point at apex, and saw-toothed on edges except near ends. Other characters for identification are: (1) minute yellow-green flowers ⅛ inch across, clustered at leaf bases; and (2) round or elliptic purplish black fleshy fruits 5/16 inch in diameter, single at leaf bases.

Deciduous small to medium-sized tree 50 feet high and 1 foot in trunk diameter. The bark is gray or light brown, smooth to finely fissured. Inner bark is light green and almost tasteless. The twigs are very slender, green to brown, slightly hairy when young.

The leaves are alternate in 2 rows, with minute paired stipules 1/16 inch long that shed early. The very slender leafstalks are ¼–⅜ inch long, slightly hairy. Blades are mostly small, 1½–4 inches long and ½–1½ inches wide, sometimes to 5 inches long and 3 inches wide, thin, becoming hairless or nearly so, green on upper surface, and light green beneath.

Flower clusters (cymes) at bases of new leaves, ½–2 inches long and branched, bear sev eral male flowers or 1–3 female flowers on th same tree (monoecious). Male flowers have hairy sepals more than 1/16 inch long and stamens. Female flowers have 5 sepals an pistil with ovary and 2 long finely hairy style Fruits (drupes) 2-pointed at apex, with thi flesh, large stone, and 1 rounded seed. Flowe ing and fruiting irregularly through the yea

The wood is yellowish and hard.

Rare in thickets and forests of coastal Puert Rico, particularly the southwestern part, fro sea level to 300 feet altitude and in moist lim stone valleys on islands eastward. Also Mon Desecheo, St. Croix, St. Thomas, St. John, an Tortola. Classed as a honey plant.

PUBLIC FOREST AND PARKS.—Guánica; Buc Island Reef, Virgin Islands.

RANGE.—Greater Antilles and Virgin I lands. Also southern Mexico and Guatemala

OTHER COMMON NAMES.—guacimilla, rasp dor, ruiseñor (Puerto Rico); anisillo, ama guillo, palo amargo, lejío (Dominican Repu lic); guisacillo, gageda de gallina, ramón sierra, ramón de costa, guasiriano, hues guanasa (Cuba); bois feuilles blanches, bo raie (Haiti).

286. Almez *Celtis trinervia* Lam.

Fruiting twig (above), twig with male and female flowers (below), natural size.

MULBERRY FAMILY (MORACEAE)

Trees and shrubs, sometimes herbs, known by: (1) white sap or latex usually present, often abundant; (2) leaves alternate, often in 2 rows, simple, entire, toothed, or lobed, pinnate- or palmate-veined; (3) stipules large (1 or 2 at a node), covering the conspicuous buds with long point, soon falling and leaving scars or often rings at nodes; (4) minute flowers often greenish, male and female on the same plant (monoecious) or different plants (dioecious), usually many and crowded, often i spikes or heads; (5) flowers composed of caly with usually 4 (0–6) sepals or lobes and n petals, male flower with 4–1 opposite stamen and female flower with pistil with superior o inferior 1-celled ovary and 1 ovule and 1– styles; and (6) fruit a drupe or akene, ofte multiple and fleshy, sometimes edible. Also vo 1, p. 60.

Key to species

A. Leaves deeply lobed with 7–11 lobes, very large.
  B. Leaves umbrellalike, rounded with 7–11 rounded lobes; petiole very long—20. Yagrumo hembra, trumpet-tree, *Cecropia peltata* L.
  BB. Leaves elliptic, with 7–11 long-pointed lobes; petiole short—17. Panapén, pana de pepitas, breadfruit, *Artocarpus altilis* (Parkinson) Fosberg.*
AA. Leaves not lobed (sometimes with 3–5 lobes in No. 296).
  C. Leaves with 3 or 5 main veins from base and with many small rounded teeth—296. *Morus nigra.**
  CC. Leaves not as above, mostly with 1 main vein and without teeth, sometimes with pointed teeth.
    D. Leaves in 2 rows on twig, stipule leaving small scar at node.
      E. Leaves large, 10–18 inches long, oblong, densely hairy, edges with tufts of hairs appearing like minute teeth—19. Caucho, Central American rubber, castilla rubber, *Castilla elastica* Cervantes.*
      EE. Leaves smaller, mostly elliptic, mostly hairless.
        F. Twigs often spiny; leaves 2–5 inches long, often toothed and slightly hairy; fruit multiple, green, fleshy, ½–¾ inch in diameter—287. *Chlorophora tinctoria.*
        FF. Twigs not spiny; leaves 3–6 inches or more in length, not toothed, hairless.
          G. Leaves narrowly elliptic; fruit rounded, ⅜ inch in diameter—298. *Trophis racemosa.*
          GG. Leaves oblong-elliptic; fruit elliptic, ⅜ inch in diameter—297. *Pseudolmedia spuria.*
    DD. Leaves in more than 2 rows on twig; stipule leaving ring scar at node.
      H. Leaves elliptic or obovate, 4–6 inches long, rounded at apex; fruit multiple, elliptic or rounded, very large, 1–2 feet long—18. Jaca, jackfruit, *Artocarpus heterophyllus* Lam.*
      HH. Leaves various; fruit small, figlike—*Ficus.*
        I. Leaves large, mostly more than 6 inches long.
          J. Leaves very large, fiddle-shaped or obovate, 8–12 inches long, with 2 large rounded lobes at heart-shaped base, with veins deeply sunken, stipules persistent—290. *Ficus lyrata.**
          JJ. Leaves mostly elliptic, rounded at base, with veins not sunken, stipules falling early.
            K. Buds, young twigs, petioles, and fruits with short bristly red-brown hairs—289. *Ficus drupacea.**
            KK. Buds, twigs, petioles, and fruits hairless or nearly so.
              L. Leaves with many straight, parallel lateral veins nearly at right angles to midrib—21. Palo de goma, India-rubber fig, *Ficus elastica* Roxb. ex Hornem.*
              LL. Leaves with fewer lateral veins.
                M. Leaves crowded, the midvein and 5–7 pairs of lateral veins yellowish; masses of air roots on branches and trunk—291. *Ficus nekbuda.**
                MM. Leaves not crowded, with 5–11 pairs of straight lateral veins at about 45° angle from midvein; without air roots—292. *Ficus obtusifolia.*
        II. Leaves smaller, mostly less than 6 inches long.
          N. Leaves rounded or blunt at apex.
            O. Leaves often slightly notched at base; fruit with raised ring at apex—295. *Ficus trigonata.*
            OO. Leaves rounded or blunt at base; fruit without ring at apex—294. *Ficus stahlii.*
          NN. Leaves short- or long-pointed at apex.
            P. Petiole relatively long, more than ½ inch long, blades to 4 inches or more in length.
              Q. Leaves abruptly short-pointed at apex—22. Jagüey blanco, shortleaf fig, *Ficus citrifolia* Mill. (*F. laevigata*).
              QQ. Leaves long-pointed at apex.
                R. Leaves broadly ovate, tapering to very long narrow apex, rounded at base—293. *Ficus religiosa.**
                RR. Leaves elliptic to ovate, short-pointed at base—288. *Ficus benjamina.**
            PP. Petiole short, less than ½ inch long, blades less than 3 inches long.
              S. Leaves diamond-shaped to elliptic, with 3 main veins from base—23. Laurel de la India, India-laurel fig, *Ficus microcarpa* L.f.* (*F. retusa*).
              SS. Leaves elliptic, with 1 main vein or midrib and many straight parallel lateral veins less than 1/16 inch apart—24. Jagüey colorado, *Ficus perforata* L. (*F. sintenisii*).

This spreading tree, often spiny, with whitish or cream-colored latex, is uncommon in Puerto Rico and the Virgin Islands, though widespread in tropical America. It is recognized by: (1) inner bark orange and whitish streaked, with whitish or cream-colored latex; (2) elliptic, toothed leaves alternate in 2 rows on twigs often spiny; (3) minute flowers, male in narrow slender drooping clusters, pale yellow, and female in greenish balls or heads 3/16–3/8 inch across; and (4) green multiple fruits of irregular form, 1/2–3/4 inch in diameter, fleshy, many-seeded. The secondary roots are bright red and when exposed serve for recognition.

A medium-sized deciduous tree becoming 50 feet high and 1 foot in trunk diameter, with broad spreading crown of thin foliage. The bark is light or yellowish gray, smooth or slightly fissured, with many corky dots and raised lines (lenticels) and often with some old spiny twigs. Inner bark is orange and whitish streaked, with whitish or cream-colored latex, and gritty, slightly bitter taste. Twigs green and sometimes hairy when young, becoming gray with raised dots (lenticels) and often with slender green or gray spines 3/8–3/4 inch long. The buds are covered with pointed greenish stipules less than 1/4 inch long, which shed early.

The leaves are alternate in 2 rows on the twigs, with petioles 3/8 inch long. Leaf blades are 2–5 inches long and 1–2 1/4 inches wide, thin, hairless or slightly hairy, the apex with long narrow point, the base slightly rounded, notched, or unequal, the margins usually irregularly toothed, the sides often curved upward slightly. The upper surface is green or yellow green, slightly shiny, and the lower surface dull light green.

Flowers of the two sexes are on different trees (dioecious). Male flower clusters (spikes) are 2–4 1/4 inches long and 1/8–3/16 inch in diameter and droop singly from the leaf bases or nodes. The numerous crowded male flowers are composed of minute calyx of 4–5 sepals less than 1/16 inch long and 4–5 pale yellow stamens less than 1/8 inch long, folded in bud.

The balls or heads of crowded female flowers are single at the nodes and 5/8–3/4 inch across the spreading styles. Each flower consists of a minute calyx and pistil with ovary less than 1/16 inch long and slender threadlike whitish style more than 1/4 inch long. The multiple fruit is short-stalked, very juicy, sweetish, and edible. There are many flattened brown seeds less than 1/8 inch long. Flowering and fruiting during spring and early summer.

The sapwood is whitish, well defined. The bright yellow heartwood changes upon exposure to brown or reddish, is lustrous, without distinctive odor or taste. The wood is hard, heavy (specific gravity 0.6–0.85), of medium to coarse texture, and with grain nearly straight or interlocked. It is strong, tough, and very resistant to the attack of dry-wood termites. It takes a good polish, but is slightly difficult to work.

As tested elsewhere, the wood is classed as good for all kinds of construction including naval construction, for plywood and veneer and staves. In other countries it is used also for railroad ties, bridges, piers, vehicles, cabinet-work, furniture, flooring, tool handles, posts, balls, etc.

This tree, the fustic of commerce, formerly was an important dyewood and was exported from the Antilles, Mexico, and Central America to Europe and the United States. A yellowish dye, soluble in water, has been extracted from the wood to produce the dull yellowish-brown color khaki, familiar in military uniforms. The bark has been employed in tanning. The exudate of resinous latex has been used for calking boats and in home medicine.

Rare on coastal plain, coastal hills, and limestone forests of Puerto Rico to an altitude of 300 feet in Puerto Rico. Also in Mona, Vieques, St. Croix, St. Thomas, and St. John.

PUBLIC FOREST.—Cambalache.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, and through Lesser Antilles to Barbados, Trinidad, and Bonaire and Curacao. Also from Mexico to southern Brazil, Argentina, Bolivia, and Peru.

OTHER COMMON NAMES.—mora, palo de mora (Puerto Rico, Spanish); escambrón de madera (Puerto Rico); fustic (Virgin Islands, English); palo amarillo, mora amarilla (Spanish), fustete, mora macho (Dominican Republic), mora del país, fustete (Cuba); moral, mora lisa, moral de clavo (Mexico); brasil, morillo (Costa Rica); morillo, macano (Panama), dindé, avinje, palo moro, malal fustete, morita (Colombia); moral, mora lisa, morita (Venezuela); moral fino, moral (Ecuador); insira, insira caspi, limulana, amarillo (Peru); tata yivá-saiyú (Argentina); red fustic, snood (Jamaica); bois jaune (Haiti); palu di mora, palu dushi, palu dushi di cabei (Dutch Antilles); tajuva, jurema de espinho, auroeira (Brazil).

BOTANICAL SYNONYM.—*Maclura tinctoria* (L.) D. Don.

This species is related to Osage-orange (*Maclura pomifera* (Raf.) Schneid.), native of southern continental United States, and is sometimes placed in the same genus.

287. Mora, fustic *Chlorophora tinctoria* (L.) Guad.

Twig with female flowers and fruits (left), twig with male flowers (right), natural size.

288. Laurel de Bejamina, Benjamin fig ***Ficus benjamina* L**

The wild and planted trees of the fig genus (*Ficus*), known as jagüey and fig, are recognized by: (1) milky juice, or white latex, slightly bitter or almost tasteless, which runs from cut parts, often abundantly; (2) air roots often present and extending from branches to the ground; (3) prominent long-pointed buds at end of each twig, formed by a scale (stipule) which makes a ring scar; and (4) small fleshy figlike fruits paired or single at leaf bases, sometimes edible, with minute flowers and seeds hidden inside. Eight species are described here and 4 in the first volume.

This handsome species, which is planted for shade and ornament, is recognized by: (1) the rounded spreading dense crown of shiny green foliage, more than twice as wide as high and drooping to the ground; (2) leaves small, elliptic to ovate, slightly thickened, with long narrow point and long petiole; and (3) paired elliptic figlike fruits $\frac{5}{8}$ inch long and $\frac{7}{16}$ inch wide, at maturity turning dark red to purplish black and forming a stalk $\frac{1}{8}$–$\frac{1}{4}$ inch long.

Evergreen tree 30 feet high and 80 feet in crown spread, becoming larger, hairless throughout. Trunks several to many, 1 foot or more in diameter, short, growing together with air roots in a trunklike mass more than 5 feet across. Bark is gray, smooth with warts (lenticels), the inner bark light brown and gritty, yielding from cuts milky juice or white latex. The many stout branches are widely spreading, nearly horizontal and curved down nearly to ground, bearing wirelike air roots. Twigs are slender, slightly angled and flattened, light green, becoming gray, with rings at nodes. End bud green, $\frac{3}{8}$–$\frac{1}{2}$ inch lon narrow and long-pointed, covered by a sca (stipule).

Leaves are alternate, with slender light gre petioles $\frac{1}{2}$–1 inch long, grooved above. Blad are 2–4 inches long and $\frac{3}{4}$–$1\frac{3}{4}$ inches wid short-pointed at base. The upper surface shiny green to dark green and turned u slightly on both sides of midvein, with mar fine side veins connected in a curved vein alo edge, the lower surface dull light green.

The fleshy multiple fruits (syconia) a paired, sometimes single, at leaf bases, yello green and stalkless when immature. Matu fruits are dark red to purplish black (yellow golden and larger in a variety) with lig brown dots and a dark brown dot (hole) in t sunken apex, and develop a fleshy stalk at bas With fruits in spring and fall.

Uncommonly planted for ornament and sha in Puerto Rico and the Virgin Islands and els where in the tropics. Requires a large ar and freedom from obstruction for roots.

Recommended as one of the best ornament figs for parks, school grounds, and streets south Florida. It grows fast in many kinds soil and withstands drought but not much col Popular because of the dense crown and droo ing foliage. The fruits are messy on sidewall

RANGE.—Native of southeast Asia from Ind to China and Malesia.

OTHER COMMON NAMES.—higo, higo cim rrón filipo (Dominican Republic); caucho Be jamín (Colombia); Jamaican evergreen (J maica); Ceylon willow (Trinidad); waring (Dutch Antilles).

288. Laurel de Benjamina, Benjamin fig *Ficus benjamina* L.*

Natural size.

289. Mysore fig ***Ficus drupacea* Thunb.***

This handsome spreading fig tree is rarely planted in Puerto Rico. Besides the whitish latex and other characters of the group, it is distinguished by: (1) short bristly red-brown hairs on young twigs, buds, petioles, and fruits; (2) the stout twigs with rings at nodes and ending in pointed hairy bud ¾ inch long, formed by a stipule; (3) large leaves with thick and stiff ovate blades 5–9 inches long and 3½–5 inches wide, bent up slightly on both sides of midrib; and (4) oblong stalkless figlike fruits about 1 inch long and ¾ inch in diameter, covered with reddish hairs.

A medium-sized evergreen tree 30 feet high, with trunks and surrounding vertical air roots forming a trunklike mass several feet in diameter and bordered by large horizontal roots along the surface. Many massive nearly horizontal branches form a broad flattened crown more than 100 feet across. Bark of the trunk, branches, and air roots is brown gray, smoothish or slightly fissured. The inner bark is orange brown, gritty in taste, and has whitish latex. Old twigs, buds, and petioles become gray and nearly hairless.

The alternate leaves have stout rounded petioles 1½–2½ inches long. Blades are abruptly long-pointed at apex, slightly notched or rounded at base, slightly turned under at edges, with many straight parallel side veins, the upper surface slightly shiny dark green, and the lower surface light green with raised yellowish midrib and side veins and with minute hairs.

The figlike fruits paired or single at nodes are distinctive in their oblong shape and covering of bristly red hairs, bitter in taste and not edible. Borne abundantly in summer, the fruits litter the ground beneath a tree.

Rare in parks and gardens in moist parts of Puerto Rico. A large specimen tree is located on the grounds of the University of Puerto Rico Agricultural Experiment Station at Río Piedras, a short distance below the entrance to the Forest Service Building. A handsome shade tree for parks but requiring large space.

RANGE.—Southeastern Asia from India and Ceylon to Solomon Islands and Queensland.

BOTANICAL SYNONYM.—*Ficus mysorensis* Heyne. That species has been reduced to a variety, *F. drupacea* Thunb. var. *pubescens* (Roth) Corner, native from Ceylon, India, and East Pakistan to Laos and Burma. The former specific name and the common name refer to Mysore, a State of India.

289. Mysore fig

Ficus drupacea Thunb.*

Two-thirds natural size.

290. Fiddle-leaf fig ***Ficus lyrata* Warb.***

An introduced fig tree occasionally planted for ornament and shade, distinguished from the others by: (1) the very large fiddle-shaped or lyre-shaped (obovate) leaves 8–12 inches long and 6½–8 inches wide, broadest beyond middle, stiff, thick, leathery, curved and raised from midvein, the few side veins deeply sunken, and the edges much rolled under; (2) the very large long-pointed stipules paired and about 1½ inches long, forming the bud and persistent at base of leaves; and (3) rounded or pear-shaped figlike fruits ¾–1 inch long. Like other figs, this species has milky juice, or white latex.

An evergreen medium-sized cultivated tree to 50 feet high and 1 foot in trunk diameter, with rounded crown, hairless throughout. The twigs are relatively few and very stout, ½–¾ inch in diameter, gray and smooth, becoming fissured. The rings at nodes are hidden by the persistent stipules.

The alternate leaves are attached about 2 inches apart for a distance of 2 feet or more on long unbranched twigs. The petioles are 1½–2½ inches long, very stout and slightly flattened, blue green. Leaf blades are rounded in upper two-thirds and blunt at apex, narrowed in lowest third with 2 very large rounded, overlapping lobes at the heart-shaped base. Instead of being flat like most leaves, the blades are much curved and raised between the 5–6 pairs of side veins, suggesting a relief map with valleys and ridges. The upper surface is shiny green, with midrib and side veins yellow and sunken, and the lower surface is dull yellow green with midrib and side veins yellow and raised. The leaves resemble in shape those of No. 184, almendra, Indian-almond (*Terminalia catappa* L.*). However, in that species the leaves are flat and only slightly thickened.

The figlike fruits (syconia) are stalkless and mostly paired at leaf bases, green with whitish dots, maturing in summer.

Uncommonly planted as an ornamental and street tree in Puerto Rico and St. Thomas and elsewhere in parks and gardens through the tropics. Muñoz Riviera Park in San Juan. Also southern Florida and southern Arizona. Northward grown under glass as a tub plant. Propagated by cuttings.

RANGE.—Native of tropical Africa.

OTHER COMMON NAMES.—lyrate-leaf fig (English); fiddleleaf fig (Curacao); fôlha-de-lira, ficus-lira (Brazil).

BOTANICAL SYNONYM.—*Ficus pandurata* Sander.

290. Fiddle-leaf fig *Ficus lyrata* Warb.*

Twig with very young fruits (above), one-third natural size; fruit (lower left), natural size.

291. African cloth-bark tree ***Ficus nekbuda* Warb.***

This ornamental and shade tree of the fig genus is identified by: (1) the short trunk and several stout branches which form a dense crown wider than high; (2) air roots nearly covering the trunk and growing together, also masses of hairlike air roots often hanging from the branches away from the trunk; (3) large coarse, elliptic, dark green leaves stiff and leathery crowded at ends at twigs; and (4) round yellow-green figlike fruits ½–⅝ inch in diameter, stalkless, mostly paired at leaf bases and clustered along twigs to 1 inch in diameter back of leaves.

Evergreen medium to large tree 40 feet high with crown 50 feet or more in width. The trunk 2 feet or more in diameter becomes nearly covered with masses of vertical air roots 2–4 inches in diameter, which grow together and form a trunklike mass to 5 feet across. At only 5–10 feet above the ground the trunk forks into several widely spreading stout branches. The bark is gray and smooth with warts (lenticels). Inner bark is reddish, fibrous, and almost tasteless, the cut surface yielding much white latex or milky juice almost tasteless. The stout twigs ½–⅝ inch in diameter are gray and smoothish with ring scars from stipules and raised half-round to rounded scars of leaves and fruits, also with raised dots (lenticels), becoming hairless. The end bud formed from stipules is conical, ½–¾ inch long, yellow green, with a long sharp brownish point.

The alternate leaves are crowded at ends of twigs with stout light brown petioles 1–1½ inches long, hairless. Blades are elliptic, 5–8 inches long and 3–4½ inches wide, sometimes large, blunt at apex and rounded at base, turned upward toward the slightly wavy edges. The upper surface is dark green and slightly shiny, the midvein yellowish and the 5–7 pairs of side veins also yellowish, the lower surface dull yellow green.

The fleshy multiple fruits (syconia) are slightly broader than long, have yellowish dots on the minutely hairy surface, and have 2 broad greenish scales less than ¼ inch long at base. With fruits from spring to fall.

The wood is whitish and soft.

This species is planted uncommonly for ornament and shade in Puerto Rico and St. Croix. It grows well. Extensive rows of these street trees may be seen in Old San Juan.

In temperate climates the plants can be grown under glass for decoration.

RANGE.—Native of East Tropical Africa. Planted elsewhere in the tropics.

OTHER COMMON NAME.—zulu fig (English).

Where native this is a large tree. Cloth was made from the fibrous bark, hence the descriptive common name.

291. African cloth-bark tree

Ficus nekbuda Warb.*

Two-thirds natural size.

292. Jagüey ***Ficus obtusifolia* H.B.K**

A species of jagüey or fig in St. Croix, recognized by: (1) large ovate, elliptic, or obovate leaves with blades 5–9 inches long and 2½–5½ inches wide, rounded or blunt at apex; and (2) large rounded figlike fruits ⅝–¾ inch in diameter, usually paired, finely hairy, with 2 broad scales at base.

Medium-sized evergreen tree to 45 feet high and 8 inches in trunk diameter. Bark light brown, smooth, with milky juice, or white latex. Twigs stout, gray, hairless, with rings at nodes. Bud conic, ¾–1 inch long, long-pointed, covered by stipule.

Leaves alternate, with stout petioles 1¼–2½ inches long. Blades hairless, slightly thick, rounded, notched, or short-pointed at base, not toothed on edges, with 5–11 pairs of straight side veins at about 45° angle from midvein.

The figlike multiple fruit (syconium) contains numerous tiny male and female flowers and is stalkless or nearly so. There is a small round opening at raised apex and at base 2 broad finely hairy scales ⅜–½ inch long.

Rare in dry coastal forest from sea level to 400 feet altitude in St. Croix and occasionally planted there as a shade tree. Not found in others of Virgin Islands.

RANGE.—St. Croix. Lesser Antilles at Antigua, St. Martin, St. Eustatius, Guadeloupe, Martinique, and St. Vincent. Also continental tropical America from central Mexico and British Honduras to Colombia, Venezuela, and northern Peru.

OTHER COMMON NAMES.—amate, matapalo (Guatemala); amate, capulamate (El Salvador); figuier blanc, figuier grandes-feuilles (Martinique).

BOTANICAL SYNONYMS.—*Ficus urbaniana* Warb., *F. involuta* (Lieb.) Miq. var. *urbaniana* (Warb.) Dugand.

The West Indian species *Ficus urbaniana* has been united with the continental species *F. obtusifolia*.

292. Jagüey

Ficus obtusifolia H.B.K.

Natural size.

293. Botree ***Ficus religiosa* L.***

A spreading ornamental and shade tree, characterized by: (1) drooping hairless leaves with long, very slender petioles and triangular or ovate blades almost straight at base, often wavy at border, and ending in a long, very narrow point; and (2) figlike fruits, paired and stalkless, rounded or broader than long, 3/8–1/2 inch in diameter.

Medium-sized evergreen tree to 50 feet or more in height and width, with 1 or more trunks 1–2 feet in diameter, often becoming united into pillars and often with aerial roots. Bark gray, smooth, with white, slightly bitter latex. Twigs hairless, light green, turning to gray or brown, ending in narrow pointed bud 1/4–3/4 inch long, formed by stipule, with rings at nodes.

Leaves alternate, with round yellow green petioles 2 1/2–4 inches long. Blades 4–7 inches long and 3–4 1/2 inches wide, slightly thickened, the upper surface shiny dark green with raised yellowish veins, and lower surface dull light green.

The fleshy multiple fruits (syconia) at leaf bases or on short side twigs are dark green with purplish spots, becoming dark and purplish black, almost tasteless, with many minute seeds. At the base are 3 flat rounded scales.

Uncommon as an ornamental and shade tree in Puerto Rico.

RANGE.—Native of southeast Asia but widely planted through the tropics north to Florida and southern California and in Hawaii.

OTHER COMMON NAMES.—álamo, higuillo, laurel (Dominican Republic); álamo (Cuba); higuera de las pagodas (Argentina); botree, peepul-tree (English); figueira-da-India, figueira religiosa (Brazil).

The long-stalked triangular leaves resemble those of poplar or cottonwood (*Populus*), hence the Spanish common name álamo. This species is a sacred tree of the Buddhists in India, as the scientific name suggests.

293. Botree

Ficus religiosa L.*

Natural size.

294. Jagüey ***Ficus stahlii* Warb.**

A species of jagüey in limestone hills of Puerto Rico and Mona Island, distinguished by: (1) large oblong to ovate or elliptic leaves 3–6½ inches long and 1¾–3½ inches wide, rounded or blunt at both ends; and (2) small fleshy figlike fruits paired and stalked at leaf bases, rounded and about ⅜ inch in diameter, with scales at base about ⅛ inch long.

Evergreen large tree becoming 50 feet high and 2 feet in trunk diameter. Bark brown, smoothish, with milky juice or white latex, which flows from cuts. The stout hairless twigs are ringed and end in a very narrow pointed bud to ¾ inch long, covered by a hairless scale (stipule).

The alternate hairless leaves have petioles ⅜–¾ inch long. Blades are slightly thickened, not toothed on edges, green above and paler beneath. There are about 8–10 pairs of nearly parallel side veins.

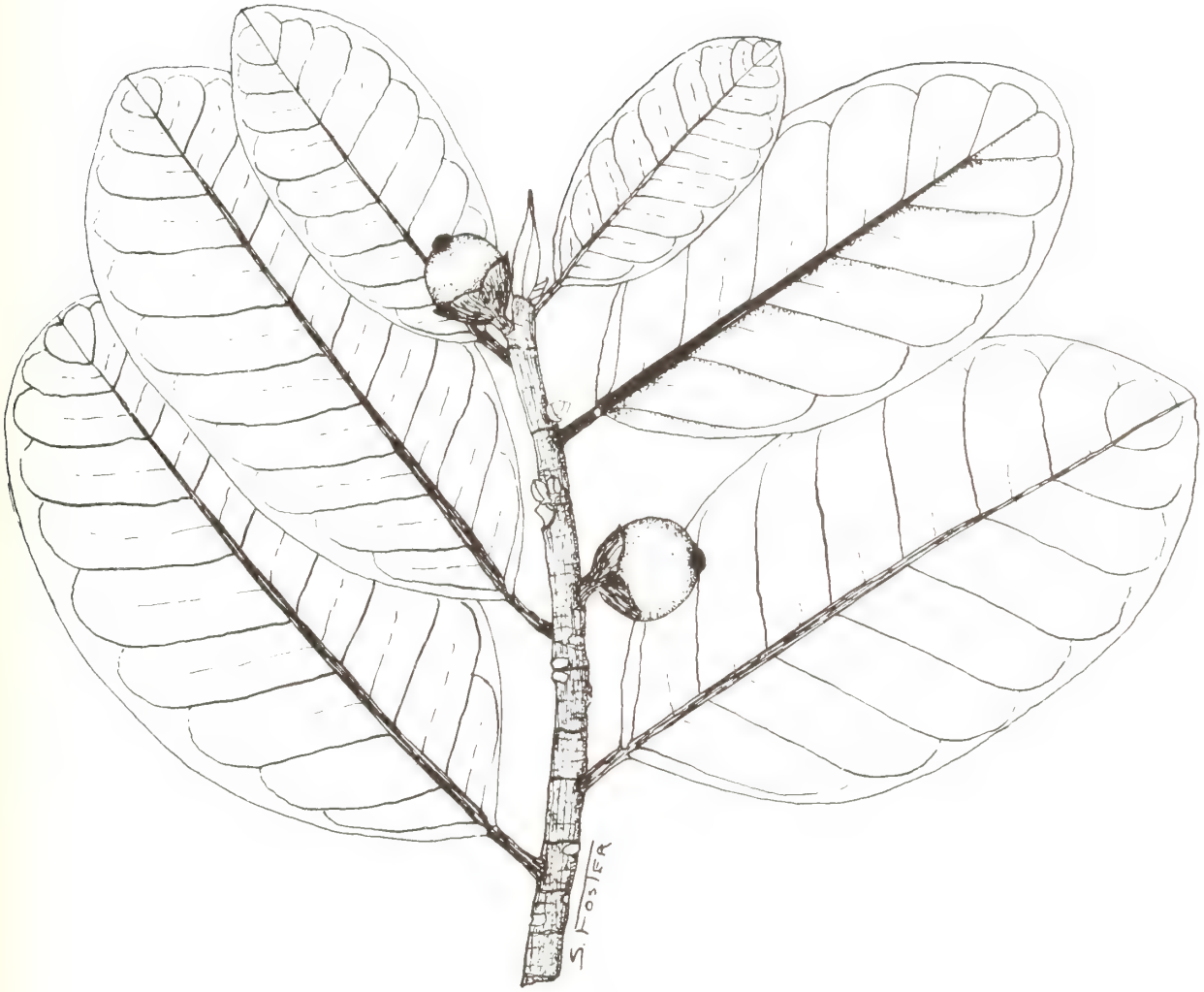
The fleshy multiple fruits (syconia) are borne on stout stalks ⅛–¼ inch long. At the base are 2 broad scales (bracts) about ⅛ inch long, finely hairy. An opening is prominent at the apex. Inside the edible fruit are borne many tiny male and female flowers (monoecious) and seeds. Fruiting in spring.

Uncommon on limestone hills from sea level to 300 feet altitude along north coast of Puerto Rico and also Mona Island.

PUBLIC FORESTS.—Cambalache, Vega.

RANGE.—Known only from Puerto Rico and Mona.

This species has been united with a more common species, No. 295, *Ficus trigonata* L. (*F. crassinervia* Desf.), but seems distinct. The latter has a raised ring around opening at apex of fruit. Named for Agustín Stahl (1842–1917), Puerto Rican physician and botanist, who wrote an unfinished flora of the island (*74*). He collected a specimen near his home at Bayamón.



294. Jagüey

Ficus stahlii Warb.

Natural size.

295. Jagüey, wild fig ***Ficus trigonata* L.**

Characters for recognition of this common species of jagüey or wild fig are: (1) ovate, oblong, or elliptic leaves blunt or rounded at apex, slightly notched or rounded at base, shiny green, stiff and leathery, hairless; and (2) small short-stalked figlike fruits at leaf bases, elliptic or pear-shaped and ⅜–½ inch in diameter, slightly flat-topped, with raised ring at apex, light green with brown dots, turning dark red.

Evergreen medium-sized to large spreading tree to 90 feet high and 3 feet in trunk diameter, sometimes to 6 feet, and with prominent rounded buttresses and spreading crown. The bark is gray, smoothish or slightly fissured, with almost tasteless or slightly bitter milky juice, or white latex. The inner bark is whitish and fibrous and tasteless. Twigs are gray, stout, often finely hairy when young, with ring scars at nodes. The densely hairy buds are long and narrow, ½–¾ inch long, covered by a finely hairy scale (stipule).

The alternate leaves have stout leafstalks ¼–1¼ inches long. Blades are mostly 2–6 inches long and 1¼–4 inches wide, slightly thickened and leathery, the upper surface shiny green with veins often slightly sunken, and the lower surface light green with prominent network of minute veins.

The greenish figlike fruits (syconia) are paired or single on short stalks ⅛–3/16 inch long at leaf bases, with 2 minute pointed broad scales 1/16 inch long joined at base and raised ring at apex, the surface often warty, almost tasteless. Within are many minute seeds less than 1/16 inch long. With fruits from spring to fall.

The wood is whitish and soft.

Common through moist limestone, lower Cordillera, and lower Luquillo forests at 100–3,000 feet altitude, especially mountain forests, in Puerto Rico. Also Culebra, Vieques, St. Croix, St. Thomas, and Tortola.

PUBLIC FORESTS AND PARKS.—Cambalache, Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro, Vega; Sage Mountain.

RANGE.—Cuba, Puerto Rico and Virgin Islands, Guadeloupe, Martinique, and St. Lucia. Also from southern Mexico to Colombia and Venezuela.

OTHER COMMON NAMES.—jagüey blanco (Puerto Rico); higo cimarrón (Dominican Republic); jagüey (Cuba); chimón, higo (Guatemala); figuier (Haiti); figuier maudit (Martinique).

BOTANICAL SYNONYM.—*Ficus crassinervia* Desf.

295. Jagüey, wild fig

Ficus trigonata L.

Natural size.

296. Mora, black mulberry ***Morus nigra* L.***

Black mulberry has been planted in Puerto Rico as an ornamental and for the edible fruits. It is characterized by: (1) milky sap; (2) ovate leaves with 3 or 5 main veins from the notched unequal base, many small rounded teeth on margin, and ending in long narrow point; and (3) edible sweet purplish black cylindric mulberries ½–1 inch long and ⅜–½ inch wide.

Small to medium-sized tree 30 feet high and 8 inches in trunk diameter, with crown of dense dark green foliage. Bark light brown, smoothish and warty to finely fissured, the inner bark whitish and brown, slightly fibrous, almost tasteless, with small amount of whitish latex. Twigs slender, light green and finely hairy when young, becoming brown with raised dots (lenticels). Winter buds 3/16 inch long, short-pointed and covered with brown overlapping scales at end of twigs and at leaf bases.

Leaves alternate in 2 rows, with slender yellow-green petioles 1–2 inches long, finely hairy. Blades ovate, mostly 4–7 inches long and 3–5 inches wide, sometimes lobed, thin, the upper surface dull dark green, smooth or rough, with veins slightly sunken, the lower surface paler and dull light green with raised veins, finely hairy.

Flowers male and female mostly on different trees (dioecious), short-stalked, in separate drooping clusters (spikes or racemes), minute, greenish, the calyx with 4 lobes more than 1/16 inch long. Male flowers short-stalked, more than ⅛ inch long and broad, consist of calyx and 4 spreading whitish stamens opposite the lobes, the cluster ¾–1 inch long and falling early. The stalkless crowded female flowers have calyx and pistil with small greenish ovary and 2-forked whitish style ⅛ inch long. The multiple fruit (syncarp) is composed of fruits from many female flowers. The 4-lobed calyx becomes enlarged to ⅛ inch across and the sweet juicy part enclosing the brown flattened akene or "seed" more than 1/16 inch long. Flowering and fruiting in spring and summer.

The light brown wood is soft.

Rarely planted as a shade tree and fruit tree in Puerto Rico. Of rapid growth. Formerly tested experimentally here as a good plant for silkworms.

This species is the source of the mulberry varieties planted for fruit in southern Europe and Asia. It is naturalized in southern continental United States and also planted northward.

RANGE.—Native of western Asia, probably Iran and nearby areas. Widely planted and naturalized in warmer regions.

OTHER COMMON NAMES.—mora negra, morera negra (Puerto Rico, Spanish); black mulberry (English).

296. Mora, black mulberry *Morus nigra* L.[3]

Twig with male flowers (upper left), twig with female flowers and fruit (center), leafy twig (below), two-thirds natural size.

297. Negra lora ***Pseudolmedia spuria*** **(Sw.) Griseb**

This tree species with milky juice, very rare in Puerto Rico, is identified by: (1) narrow oblong-elliptic leaves abruptly long-pointed at apex, alternate in 2 rows; (2) flowers minute, stalkless at leaf bases, the male many together in rounded cluster bordered by scales about ¼ inch across; (3) female flowers on other trees single or paired, more than ⅛ inch long, covered by overlapping scales with 2 stigmas protruding; and (4) elliptic red fleshy fruit ⅜ inch long.

Evergreen tree to 50 feet in height and 8 inches in trunk diameter, hairless. The bark is rough and slightly scaly, with milky juice or white latex. The twigs are slender and light brown. The narrow pointed bud to ⅜ inch long is covered by a stipule, which sheds early, leaving a slight scar but not a ring.

The alternate leaves have short leafstalks ⅛–¼ inch long. Blades are 3–6 inches long and 1¼–2¼ inches wide, short-pointed and unequal at base, not toothed on edges, the upper surface dark green, the lower surface paler with fine network of veins.

Flowers are male and female at leaf bases on different trees (dioecious). Male flowers many within a headlike group of scales (involucre), each consisting of 1 stamen about 1/16 inch long, with narrow scales but no calyx or corolla. Female flowers single or paired, each covered by overlapping scales, consisting of pistil with ovary inside calyx tube and with short style and 2 stigmas protruding. The elliptic fruit is enclosed by the fleshy calyx and contains 1 seed within a slightly hard covering.

The wood is described as with thick grayish or pinkish brown sapwood and reddish brown heartwood. It is very hard, of medium coarse texture, variable grain, tough, and strong, not durable in contact with ground.

The red cherrylike fruits are edible. Also a honey plant.

This rare species is known in Puerto Rico only from moist limestone hills near the northern coast, at altitudes of 200–600 feet, from Bayamón and Dorado to Río Abajo and Guajataca.

PUBLIC FORESTS.—Guajataca, Río Abajo.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico. Also southern Mexico, British Honduras and Guatemala.

OTHER COMMON NAMES.—palo de leche, macao (Dominican Republic); macagua (Cuba); manax (Guatemala); false breadnut, milkwood (Jamaica); cherry (British Honduras); bois mérise (Haiti).

297. Negra lora *Pseudolmedia spuria* (Sw.) Griseb.

Twig with male flowers (above), twig with female flowers (lower left), twig with fruits (lower right), natural size.

298. Ramón *Trophis racemosa* (L.) Urba

This rare tree with milky sap in twigs is characterized by: (1) narrowly elliptic leaves 3½–7 inches long and 1¾–2¾ inches wide, long-pointed at apex, sometimes toothed on edges, alternate in 2 rows; (2) flowers male and female on different trees, small, stalkless in clusters (spikes) at leaf bases; and (3) rounded fleshy fruit ⅜ inch in diameter.

Medium-sized evergreen tree 70 feet high and 1½ feet in trunk diameter, also flowering as a shrub. Bark gray, smooth, with few horizontal lines, becoming very rough and scaly in age. The inner bark is whitish, with green outer layer, tasteless. Young twigs are green with minute hairs, becoming gray brown. The light green buds ⅛ inch long are covered with 2 pointed stipules, which shed early leaving a slight scar.

The leaves are alternate in 2 rows along the slender twigs. Leafstalks are ¼–½ inch long, slender minutely hairy. Blades are short-pointed or rounded at base, hairless, thin, edges without teeth or sometimes with few small teeth toward apex, upper surface dark green and slightly shiny, lower surface dull green with the few side veins raised.

Narrow cylindric flower clusters (spikes) single or paired at leaf bases, 1½–4 inches long and ¼ inch broad, bear many crowded light yellow male flowers less than ⅛ inch long, composed of 4-lobed hairy calyx and 4 stamens. On other trees (dioecious) are short cluster (spikes) less than ¾ inch long, which bear fe greenish female flowers about 3/16 inch long consisting of tubular 4-toothed hairy calyx en closing the ovary and 2–forked hairy style. Th berrylike reddish-brown hairy fruit contain within the fleshy calyx 1 reddish-brow rounded seed ⅛ inch in diameter. The fruit i edible but has thin flesh. Flowering irregularl during the year.

Wood light, brown, hard.

Elsewhere the foliage has been cut for fodde for livestock during the dry season.

Rare in moist limestone and lower Cordiller forests from sea level to 1,800 feet altitude i Puerto Rico. Also Vieques.

PUBLIC FORESTS.—Cambalache, Guajataca Maricao, Río Abajo, Vega.

RANGE.—Greater Antilles. Also from Mexic and British Honduras to Colombia, Venezuel Ecuador, and Peru.

OTHER COMMON NAMES.—ramoncillo (Puer Rico); ramón (Spanish); ramón de vaca (D minican Republic); ramón de bestia (Domin can Republic, Cuba); ramón de caballo bálsamo (Cuba); ramoncillo, ushi (Mexico ramón colorado (Guatemala); ojushte, chul juste, pilijuste (El Salvador); ojoche mach breadnut (Panama); marfil (Venezuela ramoon (Jamaica); ramón, white ramón (Bri ish Honduras); ramón, bois neuf rame (Haiti).

298. Ramón *Trophis racemosa* (L.) Urban

Twig with fruits (upper left), twig with female flowers (center), twig with male flowers (right), two-thirds natural size.

Herbs, sometimes shrubs, and less frequently small trees and vines, known by: (1) leaves mostly alternate, simple, often with 3 or 5 main veins from base, toothed, sometimes with stinging hairs, often with minute lines (cystoliths) visible from lower surface (especially when dry), with paired stipules; (2) flowers usually in lateral branched clusters (cymes), minute, inconspicuous, greenish or whitish, male and female on different plants (dioecious) or the same plant (monoecious), regular, with calyx of 4–5 sepals or lobes, no corolla, 4–5 opposite stamens, and pistil with 1-celled ovary with 1 ovule, style, and branched stigma; and (3) fruit an akene or drupe, often enclosed by the persistent fleshy calyx.

Key to species

A. Leaves coarsely toothed, with large stout conical stinging hairs on surface—299. *Urera baccifera.*
AA. Leaves finely wavy toothed, with small stinging hairs.
B. Leaves elliptic, widest near middle, rounded or slightly notched at base—301. *Urera chlorocarpa.*
BB. Leaves broadly ovate, widest below middle, notched at base—300. *Urera caracasana.*

299. Ortiga brava, stinging nettle ***Urera baccifera* (L.) Gaud.**

Ortiga brava or stinging nettle, which stings severely and painfully, is commonly a shrub in the understory of moist forests but sometimes becomes a small tree. It is easily identified by: (1) the many large sharp needlelike stinging hairs about 1/8 inch long on stems and leaves, both leafstalk and blade; (2) the coarsely toothed elliptic to ovate leaves bearing on both surfaces large stout and conical stinging hairs; (3) the small greenish or pinkish flowers clustered at leaf bases; and (4) the whitish to reddish elliptic watery fruits about 1/4 inch in diameter.

Evergreen shrub, rarely becoming a small tree 15 feet or more in height and 3 inches in trunk diameter, usually with several main stems. The bark is light gray, smooth, with few raised warts (lenticels) and few spines or stinging hairs. Inner bark has an outer light green layer and is whitish, soft, watery, almost tasteless. The twigs are stout, light green, almost hairless, with scattered stout stinging hairs, raised large half-round leaf scars, and large greenish pith.

The large alternate leaves have long stout petioles 1 1/2–4 inches long, round, purplish tinged, and bearing many stinging hairs. Narrow pointed light green stipules 3/8 inch long form a pointed bud and fall early. The thin blades are 5–10 inches long and 3–5 inches wide, narrowed to a long point at apex, rounded or slightly notched at base, the margin coarsely toothed with teeth ending in stinging hairs. The upper surface is yellow green and slightly shiny, with veins and veinlets much sunken, the lower surface light green and slightly shiny, with many stinging hairs along the raised veins.

The minute flowers are male and female on different plants (dioecious) in widely forking branched clusters (cymes) 1–2 1/2 inches long at leaf bases, with fleshy purplish branches. Female flowers about 1/16 inch long have pinkish 5-toothed calyx and pistil with ovary and tufted whitish stigma. Male flowers have calyx and 4 or 5 stamens. Fruits several, elliptic, consisting of enlarged whitish watery calyx 5-lobed at apex enclosing 1 elliptic seed (akene) 1/8 inch long, shiny, greenish black. Flowering in autumn and fruiting in winter.

In Central America this species has been planted for hedges and fences, its spines making an impenetrable wall.

Common in understory of wet forests, especially in drainages, of moist limestone, lower Cordillera, and lower Luquillo forests from sea level to 3,000 feet altitude through Puerto Rico. Also a weed in coffee areas. Recorded from St. Thomas.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro, Vega.

RANGE.—Greater Antilles, St. Thomas, St. Vincent, Grenada, and Trinidad and Tobago. Also widespread from Mexico to Brazil, Argentina, Bolivia, and Peru.

OTHER COMMON NAMES.—ortiga (Puerto Rico, Spanish, Portuguese); pringamoza (Spanish); mala mujer (Mexico); chichicaste (Central America); chichicastón, nigua, nigüillo, chichicaste cuyanigua (El Salvador); guaritoto (Venezuela); ishanga (Peru); ortiga brava, ortiga colorada (Argentina); stinging nettle (English); manmanguêpes, feuilles enragées (Haiti); urtiga bronca, urtiga grauda, ortiga de cipó (Brazil)

299. Ortiga brava, stinging nettle *Urera baccifera* (L.) Gaud.

Leafy twig (above), twig with female flowers (below), fruits (lower right), natural size.

300. Ortiga colorado, stinging nettle *Urera caracasana* (Jacq.) Gau

A nettle with stinging hairs recorded from Luquillo Mountains. It is characterized by: (1) large leaves with long petioles and broadly ovate blades, the border with blunt teeth and the base notched or heart-shaped with 3 principal veins; (2) stinging hairs on midvein beneath and often on petioles and branches of flower clusters; (3) many inconspicuous tiny flowers $\frac{1}{16}$ inch long, greenish or pink in stalked clusters back of leaves; and (4) very juicy orange-red or whitish fruits nearly $\frac{1}{8}$ inch in diameter.

Small evergreen tree 20 feet high or a shrub, elsewhere to 30 feet high and 6 inches in trunk diameter. The bark is gray to greenish brown, smooth or slightly fissured. Inner bark is light green, almost tasteless. Twigs are slightly stout and fleshy, often grooved, greenish but becoming brown.

The alternate leaves have long round light-green petioles 2–5 inches long. Leaf blades are $2\frac{1}{2}$–12 inches long and $1\frac{1}{4}$–10 inches broad, thin, long- or short-pointed at apex, the upper surface dull green and often slightly rough, and the lower surface light gray green and finely hairy. The stinging hairs $\frac{1}{16}$ inch long on the midvein beneath are almost flat and point toward the base. If the finger rubs the midvein toward the apex of the blade, the needlelike hairs prick the skin and inject quantities of formic acid and cause pain. However, if rubbing is in the opposite direction, the hairs do not sting.

The flower clusters (cymes) are widely forking and spreading. Male and female flowers mostly are on different trees (dioecious). Male flowers have 4 light pink sepals, 4 stamens, and rudimentary pistil. Female flowers several in yellow-green fleshy masses about $\frac{1}{8}$ inch in diameter, each with 4 unequal rounded green sepals less than $\frac{1}{16}$ inch long and pistil with ovule. The seeds (akenes) about $\frac{1}{16}$ inch lon are partly covered by the very juicy sepal forming the rounded fruit.

The whitish wood is soft and watery an not used. Elsewhere these stinging plants ar employed as hedges or living fences.

In Puerto Rico rare and local in forest under story in Luquillo Mountains. Not found by th authors.

PUBLIC FOREST.—Luquillo.

RANGE.—Jamaica, Puerto Rico, St. Eustatius Saba, Guadeloupe, Martinique, St. Lucia, S Vincent, and Trinidad. Also widespread fror Mexico south to Brazil, Argentina, Paraguay and Peru.

OTHER COMMON NAMES.—mal hombr (Puerto Rico); ortiga (Spanish); stingin nettle (English); quemador, laal, laltsimin, or tiga de caballo (Mexico); chichicaste (Centra America); chichicaste de hormiga, chichi castón, la (Guatemala); chichicaste de flore rosadas (El Salvador); ortiga blanca, taba quillo, crespón (Costa Rica); pringamoza (Co lombia, Venezuela); picatón, guaritoto hembr (Venezuela); orteguilla macho (Ecuador) ishanga, ishanga del agua (Peru); ortiga brav (Argentina); bois fridoche (Guadeloupe) urtiga (Brazil).

This species, though of broad range throug tropical America, is the rarest of the 3 nativ species of the genus in Puerto Rico. It is of spe cial interest as apparently the ancestor of th more common closely related species, No. 301, ortiga, stinging nettle, *Urera chlorocarpa* Urban, which is known only from Puerto Rica mountains including Luquillo Mountains. Th scientific name obviously honors Caracas, Vene zuela.

300. Ortiga colorada, stinging nettle *Urera caracasana* (Jacq.) Gaud.

Fruiting twig, male flowers (lower right), two-thirds natural size.

301. Ortiga, stinging nettle *Urera chlorocarpa* Urb

This rare shrub or small tree of moist forests is quickly learned to be avoided because of its stinging hairs on young twigs, petioles, and on midrib and larger veins of lower leaf surfaces. It is recognized by: (1) long-stalked elliptic, thin leaves 5–10 inches long, and 2¾–4½ inches wide, widest near middle, long-pointed at apex, with 3 main veins from the rounded or slightly notched base, finely wavy-toothed, the upper surface dull green with network of veins sunken; and (2) the tiny greenish flowers and fruits in crowded clusters up to 1 inch across at leaf bases and on twigs back of leaves.

A shrub or small tree to 15 feet high and 3 inches in trunk diameter. The bark is light brown, smooth with minute warts (lenticels). The inner bark is whitish and tasteless. Twigs long, with few branches, stout, slightly angled, finely hairy, light green, becoming brownish, with light dots (lenticels) and with raised large triangular leaf scars, containing thin ring of wood and large greenish pith. The bud is formed by folded young leaves covered with stipules. At the base of each immature leaf is a stipule apparently double, a narrow pointed yellow-green scale ⅜–½ inch long inserted inside base of petiole, enclosing the next youngest leaf and growing point and shedding before leaves mature, forming a scar.

The alternate leaves have long stout petioles 2–4 inches long, round with a narrow groove above, light green, often pinkish tinged. The thin soft blades, described above, have the upper surface slightly rough from scattered hairs or becoming nearly hairless, the lower surface light green, soft hairy with raised network of veins.

The flower clusters (cymes) about 1 inch long and broad, are much branched regularly into 2 short slender forks, bearing numerous minute flowers on very short stalks. Male and female flowers apparently are borne either on the same plant (monoecious) or on different plants (dioecious). The female flower is m nute, less than 1/32 inch long, light green, cor posed of calyx of 4 lobes, the outer 2 smalle and pistil with elliptic 1-celled ovary containi 1 ovule and the whitish brushlike stigm Fruits elliptic, light green, 1/16 inch long, co sisting of juicy 4-lobed calyx and round flattened greenish-brown seed (akene) wit stigma at tip. Flowering and fruiting main in winter.

The sapwood is whitish and slightly hard.

Rare in wet soil, such as along ravines, low and upper Cordillera and Luquillo forests 1,000–3,000 feet altitude.

PUBLIC FORESTS.—Luquillo, Toro Negro.

RANGE.—Known only from Puerto Rico.

This species is characterized by greeni fruits, the derivation of the specific name. is described as having male and female flowe on the same plant, but only female flowers a fruits were observed on the specimen examine Recorded as a shrub 6–13 feet high but fou recently to reach tree size.

Closely related to No. 300, ortiga colorad stinging nettle, *Urera caracasana* (Jacq Gaud., a species widely distributed in con nental tropical America and the West Indie including Luquillo Mountains. The latter h broader, ovate leaves broadly notched or hea shaped at base, male and female flowers usual on different plants, and the fruits orange re

The native species of this genus are know as ortiga or stinging nettle. The stinging hai larger than the other hairs and projecting at angle, have a needlelike point and are filled wi transparent liquid, more in a swelling at ba When the skin touches a stinging hair, the e of the hair breaks off and the pressure inje the liquid into the flesh. This liquid is form acid, similar to that of ant stings, and caus stinging pain that lasts from several minutes several hours. In continental United States t herbaceous relatives in this family with simil hairs are called nettles (*Urtica*).

301. Ortiga

Urera chlorocarpa Urban

Twig with female flowers, fruits (below), two-thirds natural size.

Trees and shrubs, known by: (1) leaves mostly alternate, simple, entire or deeply lobed, without stipules; (2) flowers mostly stalked on 1 side of axis (raceme) or in showy heads, bisexual, often irregular, with colored 4-lobed calyx, no corolla, 4 stamens opposite and inserted on calyx, and pistil often stalked, with superior 1-celled ovary, 1 to many ovules, and slender style; and (3) fruit a follicle, nut, or drupe.

Key to species

A. Leaves alternate, fernlike, pinnate and deeply lobed, silky hairy beneath—302. *Grevillea robusta.**
AA. Leaves in whorls of 3 or 4, simple, oblong or lanceolate, saw-toothed, hairless—303. *Macadamia ternifolia.*

302. Roble de seda, silk-oak ***Grevillea robusta* A. Cunn.**

Roble de seda or silk-oak, an attractive Australian tree planted for shade and ornament, is recognized by: (1) fernlike leaves pinnate and deeply lobed, dark green above, the lower surface silky with whitish or ash-colored hairs; (2) flower clusters of showy yellowish flowers on one side of the axis; and (3) black curved podlike fruits about ¾ inch long on slender stalks and with long threadlike styles.

A handsome planted medium-sized tree to 70 feet in height and 14 inches in trunk diameter, elsewhere attaining larger size, with straight axis and many branches. The bark is smooth gray on the branches, becoming rough with many deep furrows.

The alternate pinnate fernlike leaves 6–12 inches long are almost bipinnate, being deeply divided into narrow pointed lobes with borders turned under.

The unbranched flower clusters (racemes) 3–7 inches long arise mostly from the trunk, along twigs back of leaves, and at leaf bases. The numerous flowers with long slender stalks ⅜–¾ inch long are crowded on one side of the axis. They are composed of 4 narrow yellowish sepals almost ½ inch long, curved downward; no petals; 4 stalkless stamens inserted on the sepals and opposite them; and pistil with stalk, ovary, long slender curved style, and enlarged stigma. The podlike fruits (follicles) are broad, slightly flattened and split open on 1 side. Seeds 1 or 2, about ⅜ inch long, elliptic, flattened, winged, brown. Collected with flowers and fruits in September.

The light brown wood is attractive because of the prominent lines or rays, resembling oak or roble, as the common names suggest. It is durable but very susceptible to attack by dry-wood termites. Elsewhere the wood is utilized for furniture, cabinetmaking, paneling, interiors, and barrel staves.

The trees are propagated readily from th great quantities of seeds, grow rapidly, and ar drought resistant. However, the branches brea easily, and the trees become very infested wit scale insects.

Silk-oak has been widely planted in variou parts of Puerto Rico for shade and ornament such as along roads. However, planting is n longer recommended. The trees are heavil attacked by scale insects, and the silky foliag becomes dirty.

In some countries the trees have served a coffee shade. Also, they are grown for shad and ornament, along highways, and in re forestation. This species is classed as a hone plant.

Northward in temperate climates, as in con tinental United States, the fernlike plants ar grown indoors in pots. This species is plante and naturalized in southern Florida, grow also in southern Arizona and southern Cali fornia. Recommended in central and sout Florida as a fast growing flowering tree fo well drained sandy soils. It is drought resistan and cold hardy. However, it produces much lea litter and becomes ragged when large.

PUBLIC FOREST.—Maricao.

RANGE.—Native of Australia but widely ir troduced and naturalized in tropical and sub tropical regions of the world. Through Wes Indies and from Mexico to Brazil, Argentina and Peru. Naturalized in southern Florida.

OTHER COMMON NAMES.—roble australian roble de pelota (Puerto Rico); grevilea, gra vilea, "helecho" (Spanish); pino rojo (Vene zuela); roble australiano (Colombia); robl sedoso (Argentina); silk-oak (English); silk oak grevillea (United States); grevílea, ca valho sedoso (Brazil).

302. Roble de seda, silk-oak *Grevillea robusta* A. Cunn.*

Flowers (upper left), leaf, fruits (lower right), two-thirds natural size.

303. Macadamia ***Macadamia ternifolia* F. Muell.**

This medium-sized evergreen tree 30 feet or more in height and 6 inches in trunk diameter, has been introduced sparingly in Puerto Rico as an ornamental and in experiments. Elsewhere in the tropics it is cultivated for its edible seeds or nuts. Distinguishing characters are: (1) leaves in 3's or 4's (whorled), narrowly oblong, 3½–6 inches long (reported to 12 inches) and 1–2 inches wide, short-stalked, thick, stiff, and spreading, blunt at apex, with sunken midrib, edges much curved under and mostly with few minute sharp teeth, slightly shiny green, and hairless; (2) many short-stalked whitish flowers ¼–⅜ inch long i drooping narrow clusters (racemes) 4–6 inche long at leaf bases, consisting of 4 very narro whitish sepals each bearing a stamen and pist with narrow hairy ovary and long bent style and (3) round fruit nearly 1 inch in diameter splitting in 2 parts and containing 1 round ver hard thick-shelled whitish edible seed or nu ½–¾ inch in diameter. Native of Queenslan and New South Wales, Australia. OTHER COMMON NAMES.—nuez de Australia (Puert Rico); nuez de Queensland (Puerto Rico, Spar ish); Queensland-nut (English).

OLAX FAMILY (OLACACEAE)

Trees, shrubs, and woody vines, mostly Old World, known by: (1) leaves mostly alternate, simple, and entire, without stipules; (2) small flowers in lateral clusters, mostly bisexual, regular, with 4–6 minute sepals, corolla of 4–6 petals or lobes, 4–12 stamens opposite petal (or more numerous), disk often present, an pistil of 5 cells each with 1 ovule, style, an 2–5 lobed stigma; and (3) fruit a drupe o berry, 1-seeded.

Key to species

A. Twigs with straight stout spines single at nodes—307. *Ximenia americana.*
AA. Twigs spineless—*Schoepfia.*
B. Leaves less than 1¾ inches long, obovate or elliptic, rounded at apex—305. *Schoepfia obovata.*
BB. Leaves more than 1½ inches long, pointed at apex.
C. Leaves ovate, gradually narrowed to blunt apex; fruits ⅝ inch long, shiny red—304. *Schoepfia arenaria.*
CC. Leaves lanceolate-ovate to ovate, long-pointed at apex; fruits ⅜ inch long, red to black—306. *Schoepfia schreberi.*

304. ***Schoepfia arenaria* Britto**

Rare shrub of coastal forests of northern Puerto Rico, sometimes a small tree. Distinguished by: (1) ovate leaves 1¾–3¾ inches long, ⅞–2¼ inches wide, gradually narrowed to a blunt apex, short-pointed or rounded at base, not toothed on edges, slightly thickened, with few indistinct long curved side veins; (2) flowers 2–3 at leaf bases, ¼ inch long, tubular, light yellow; and (3) elliptic shiny red fruits ⅝ inch long, fleshy.

Evergreen shrub or sometimes a small spreading tree 20 feet high with several trunks from base to 4 inches in diameter, hairless throughout. Bark gray, very thick, deeply furrowed, the outer dead bark chocolate colored within. The inner bark dark pink, tasteless. Twigs slender, light gray, hairless.

Leaves alternate, without stipules, with petioles ⅛ inch long. Upper surface green and slightly shiny, lower surface dull light green.

Flowers 2–3 at end of a stalk ¼–½ inch long at leaf bases. The tubular light yellow flower ¼ inch long consists of small 4-toothed calyx, tubular 4–6 lobed corolla, 4–6 stamens on co rolla opposite lobes, and pistil with 3-celle ovary partly in a disk and inferior and wit style inside tube. Fruits (drupes) elliptic, ⅝ inch long and ½ inch in diameter, with ring a apex, light green when immature, becomin shiny red, with thick whitish flesh and larg stone. Seed 1, elliptic, ⅜ inch long, ligh brown. Flowering mainly in spring and fa and fruiting in summer and winter.

The wood is light brown and hard.

Rare in moist coastal and lower Cordiller forests at 100–1,500 feet altitude in norther foothills of Puerto Rico.

PUBLIC FOREST.—Río Abajo.

RANGE.—Northern Puerto Rico.

This rare species was discovered at a sand coastal thicket at San José Lagoon, Santurce and for many years was known only from there. Afterwards it was found near Quebradillas. The specific name, meaning sandy, refers to th first locality, where Amos Arthur Heller foun it in 1899.

304. *Schoepfia arenaria* Britton

Fruiting twig (above), flowering twig (below), natural size.

305. Araña *Schoepfia obovata* C. Wright

Shrub or small tree of dry forests, recognized by: (1) small flat obovate or elliptic leaves ¾–1¼ inches long and ⅜–⅞ inch wide, rounded at apex and narrowed to the short-pointed base, slightly thickened; (2) flowers 1–3 at leaf bases 3/16–¼ inch long, with red to greenish yellow tubular 4-lobed corolla; and (3) round to elliptic fruits, 5/16 inch long, yellow or red, fleshy.

Evergreen shrub 6–10 feet high or small tree to 25 feet and 4 inches in trunk diameter, hairless throughout. Bark gray, rough, furrowed into narrow plates. Twigs slender, light gray, much branched.

Leaves alternate, without stipules, with leafstalks less than ⅛ inch long. Blades slightly turned under at edges, with few curved side veins, dull light green.

Flowers 1–3 at end of stalk ¼ inch long or less at leaf bases. The red to greenish-yellow flower ¼ inch long is composed of minute 4-toothed calyx, bell-shaped corolla with 4 spreading lobes, 4 tiny stamens on corolla opposite lobes, and pistil with 3-celled ovary partly in a disk and inferior, short style, and dotlike 3-lobed stigma. Fruits are round to elliptic drupes with ring at apex. Collected with flowers and fruits in winter and spring.

Locally common in dry coastal forests from sea level to 500 feet altitude along the south coast of Puerto Rico west of Ponce. Also Muertos and Anegada.

PUBLIC FORESTS.—Guánica, Susúa.

RANGE.—Bahamas, Cuba, Hispaniola, Puerto Rico, and Anegada.

OTHER COMMON NAME.—white beefwood (Bahamas).

305. Araña *Schoepfia obovata* C. Wright

Natural size.

306. ***Schoepfia schreberi* J. F. Gmel.**

This shrub or small tree is absent from Puerto Rico but rare on the islands eastward. Distinguishing characters are: (1) lanceolate-ovate to ovate short-stalked leaves 1½–3 inches long and ¾–2 inches broad, slightly thickened and with few indistinct veins, frequently folded; (2) flowers 1–3 at leaf bases nearly ¼ inch long, the pale yellow corolla with reddish lobes; and (3) elliptic fleshy fruits ⅜ inch long and ¼ inch in diameter, red or black.

An evergreen shrub or small erect tree to 25 feet high with single trunk to 5 inches in diameter. Bark deeply furrowed. Twigs slender, hairless.

Leaves alternate, hairless, without stipules, with petioles about ⅛ inch long. Blades are long-pointed at apex and rounded or short-pointed at base, frequently folded and curved upward from midvein or V-shaped, not toothed on edges.

Flowers 1–3 at end of short stalk ⅛–⅜ inch long at leaf bases, composed of minute 4-toothed calyx, bell-shaped 4-lobed corolla, 4 stamens on corolla opposite lobes, and pistil with round 3-celled ovary partly inferior in a disk and short style. Fruits (drupes) are partly covered by the disk.

Rare on mountain ridges in dry coastal or seasonal forest from sea level to 500 feet altitude in Culebra, Vieques, St. Thomas, and St. Croix.

RANGE.—Culebra, Vieques, Virgin Islands, and Lesser Antilles from St. Barts and Saba to Grenada, Barbados, Trinidad and Tobago, and Bonaire, Curacao, and Aruba. Also from Mexico and British Honduras to Colombia and Venezuela.

OTHER COMMON NAMES.—tecolotillo (Mexico); limoncillo (Guatemala); sombra de armado (Honduras); paaloe swaati (Curacao).

This species is an erect tree with single trunk, while the related Puerto Rican species, No. 304, *Schoepfia arenaria* Britton, is a spreading tree with several trunks from the base.

306. *Schoepfia schreberi* Gmel.

Fruiting twig (above), flowering twig (lower left), natural size.

307. Tallowwood ***Ximenia americana* L.**

This shiny-leaved shrub or small tree is rare in dry areas of St. Thomas and southwestern Puerto Rico. It is distinguished by: (1) the straight stout sharp spines ⅜–1 inch long, single at nodes of twigs; (2) oblong or elliptic leaves 1¼–2½ inches long and ⅝–1¼ inches wide, the apex rounded or notched and the base short-pointed; (3) the fragrant yellowish white flowers ⅜ inch long, bell-shaped with 4 very curved narrow petals bearing long hairs within, few at leaf bases; and (4) the yellow elliptic to round fruits (drupes) ¾–1¼ inches long and ⅝–1 inch in diameter, with 1 large seed.

Shrub or small tree probably deciduous (also evergreen elsewhere), to 25 feet high and 10 inches in trunk diameter, with spreading branches often twisted. Bark dark red, astringent. The twigs are reddish brown or gray, and the gray spines arise as short twigs.

The alternate leaves have short petioles less than ⅜ inch long. Leaf blades are slightly thick and leathery, not toothed on edges, hairless at maturity, the upper surface shiny green, and the lower surface pale green.

Flower clusters (cymes) lateral at base of leaves bear 2–4 flowers on slender stalks. The flower is composed of the minute 4-toothed green calyx less than 1/16 inch long; the yellowish-white corolla with 4 narrow petals ⅜ inch long, curved and bearing long hairs within; 8 narrow stamens; and pistil with oblong green ovary 1-celled (4 cells at base) and slender style. The fruit contains thin pulp slightly sweet or sour and 1 large pale yellow seed rich in oil.

As some common names indicate, the sour fruit is edible raw and cooked though not popular. It has the odor of hydrocyanic acid and perhaps may be toxic in quantities. It is reported that the oily seeds can be eaten when toasted, also that the leaves are toxic to livestock.

The sapwood is yellow and the heartwood reddish brown or orange. The wood is slightly fragrant, very hard, very heavy (specific gravity 0.95), and fine-textured. It is hard, easy to work, and takes a fine polish. Elsewhere the wood has been used as a substitute for sandalwood or sándalo (*Santalum*). The astringent bark has served also in tanning.

Rare in dry coastal forest of southwestern Puerto Rico west of Ponce and at Guánica Forest from sea level to 500 feet altitude, also Water Island and St. Thomas.

PUBLIC FOREST.—Guánica.

RANGE.—Widely distributed on tropical and subtropical shores and inland in both New and Old Worlds including tropical islands. Florida including Florida Keys, Bahamas, Greater Antilles, St. Thomas, Guadeloupe, Martinique, Trinidad, and Bonaire. Also from central Mexico south to Brazil, Argentina, and Bolivia. Also in Africa, Asia, Australia, and Pacific Islands.

OTHER COMMON NAMES.—limoncillo, manzanilla, ciruelillo (Spanish); jicaco, (Dominican Republic); ciruelillo, jía manzanilla, yaná (Cuba); membrillo de monte, tocote de monte, tepenance (Guatemala); cagalero, chocomico (Honduras); manzanillo (El Salvador); pepenance (El Salvador, Costa Rica); chocomico (Nicaragua); limoncillo de playa, caimito de monte, espino de brujo (Colombia); manzana guayaba, manzana del diablo, tigrito (Venezuela); albarillo del campo (Argentina); tallowwood, hog-plum (United States); tallowwood, Spanish-plum (Bahamas, British West Indies); iguana-berry, tallow-plum, wild-olive (Jamaica); seaside-plum (Trinidad); wiri, wild-lime (Guyana); croc, macaby (Haiti); bois puant, prune bord de mer (Martinique); ishiri (Bonaire); fransman moppé (Surinam); ameixa de espinho (Brazil).

This species was first found in St. Thomas in 1925 but apparently was not collected in Puerto Rico by botanists until about 1960.

307. Tallowwood *Ximenia americana* L.

Flowering twig, fruit (below), natural size.

BUCKWHEAT FAMILY (POLYGONACEAE)

Few tropical trees, also tropical shrubs and woody vines, and mostly herbs, known by: (1) nodes enlarged with rings and a membranous closed sheath (ocrea) from stipule; (2) leaves alternate, simple, entire; (3) small flowers in unbranched clusters (racemes or spikes), male and female on different plants (dioecious) or the same plant (monoecious) or bisexual, regular, the parts commonly in 3's, mostly with 3 sepals and 3 petals, 6–9 stamens, and pistil with superior 1-celled ovary containing 1 ovule, style and 2–4 stigmas; and (4) fruit a triangular or flattened akene enclosed by the calyx which sometimes is fleshy. Also vol. 1, p. 76.

Key to species

A. Leaves oblong, long-pointed, with many parallel nearly straight lateral veins and with 2–5 faint lines on each side of and parallel with midrib; fruits dry, with 3 showy pink wings—30. Triplaris, anttree, *Triplaris cumingiana* Fisch. & Mey.* (*T. americana*).

AA. Leaves variously shaped, mostly rounded, blunt, or short-pointed, with fewer lateral veins and without faint lines; fruits slightly fleshy, not winged—*Coccoloba.*

B. Leaves thin or membranous, oblong-lanceolate to elliptic, mostly 4–7 inches long and 1½–3½ inches wide usually broadest beyond middle; flower bracts black; calyx lobes long and covering seed (akene)—29. Calambreña, chicory-grape, *Coccoloba venosa* L.

BB. Leaves thick to fleshy, variously shaped; flower bracts brown; calyx lobes short and at end of seed (akene)

C. Leaves round or nearly so, about as wide as long.

D. Leaves very large, mostly 1–1½ feet in diameter.

E. Leaves nearly flat with veins in network, finely hairy beneath; twigs not angled, hairy when young—26. Moralón, *Coccoloba pubescens* L.

EE. Leaves appearing wrinkled with lateral veins deeply sunken, hairless throughout; twigs angled, hairless—312. *Coccoloba rugosa.*

DD. Leaves smaller, mostly 3–8 inches in diameter, hairless or nearly so—28. Uva de playa, seagrape. *Coccoloba uvifera* (L.) L.

CC. Leaves mostly ovate to elliptic, mostly about twice as long as broad.

F. Leaves small, mostly 1–2 inches long.

G. Leaves ovate-oblong, blunt-pointed or rounded at base, brownish when dry, minute veins long and slender; nodes swollen—310. *Coccoloba microstachya.*

GG. Leaves ovate, mostly heart-shaped at base, greenish when dry, minute veins short and stout; nodes not swollen—309. *Coccoloba krugii.*

FF. Leaves larger, more than 2½ inches long.

H. Twigs and petioles stout; blades thick and leathery.

I. Petioles ¾–1½ inches long; twigs hairless—313. *Coccoloba sintenisii.*

II. Petioles less than ⅝ inch long; twigs with rusty or golden short hairs when young—308. *Coccoloba costata.*

HH. Twigs and petioles slender; blades slightly thickened.

J. Leaves mostly on short side twigs and crowded; petiole attached above base of sheath (ocrea); blade with tufts of hairs in vein angles beneath—314. *Coccoloba tenuifolia*

JJ. Leaves mostly on long twigs, not crowded; petiole attached at base of sheath (ocrea); blade hairless.

K. Leaves mostly rounded or blunt at apex; flowers on stalks about ⅛ inch long—25. Uvilla, doveplum, *Coccoloba diversifolia* Jacq.

KK. Leaves mostly short-pointed at apex; flowers stalkless or nearly so.

L. Leaves with 6–7 pairs of lateral veins, prominent beneath—27. Ortegón. *Coccoloba swartzii* Meisn.

LL. Leaves with 4–6 pairs of lateral veins, inconspicuous beneath—311. *Coccoloba pyrifolia.*

308. Uvilla — *Coccoloba costata* C. Wright

Characters for identification of this locally common species are: (1) ovate to elliptic or rounded leathery leaves mostly 2–7 inches long and 2–4½ inches wide, rounded or blunt at apex, turned under at edges, almost stalkless; (2) twigs with enlarged ringed nodes, bearing at base of leaf a yellowish sheath (ocrea); (3) many small yellow-green flowers ⅛ inch long on stout terminal axis; and (4) egg-shaped fruits ¼ inch long.

Evergreen small tree to 25 feet high and 6 inches in trunk diameter. Bark gray, smoothish slightly fissured, with horizontal lines. Inner bark light pink, slightly bitter. The stout twigs are green when young, becoming gray and hairless.

The alternate leaves have short stout leaf stalks ⅛–⅜ inch long. Blades are short-pointed at base, thick and stiff, hairless. The upper

308. Uvilla

Coccoloba costata C. Wright

Twig with male flowers (left), fruiting twig (right), natural size.

surface is dark green and slightly shiny, the lower surface dull green.

Erect flower clusters (racemes) about 6–9 inches long bear many flowers on short stalks less than 1/16 inch long, male and female on different trees (dioecious). Male flowers less than 1/8 inch long have 5 sepals and 8 stamens. Female flowers nearly 1/8 inch long have basal tube (hypanthium), 5 calyx lobes, 8 nonfunctional stamens, and pistil with ovary and 3 styles. Fruit with calyx lobes at apex, maturing in winter.

The wood is whitish and slightly soft.

Locally common in moist coastal forest at 300–1,000 feet altitude mostly in northern foothills of Puerto Rico.

PUBLIC FORESTS.—Guajataca, Río Abajo, Susúa.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—guayabo de mulo (Dominican Republic); raisinier (Haiti).

BOTANICAL SYNONYM.—*Coccoloba rupicola* Urban.

In number of native tree species, 12, *Coccoloba* is the third largest in Puerto Rico, as noted in the Statistical Summary. The generic name meaning lobed berry refers to the calyx lobes of the grapelike fruits.

309. Wild-grape ***Coccoloba krugii* Lindau**

This shrub or small tree of dry areas is characterized by: (1) broadly ovate to nearly round leaves 1½–3½ inches long and 1–2¾ inches wide, blunt at apex and notched to short-pointed at base, slightly thick and leathery; (2) slender twigs ringed at nodes with a green sheath (ocrea) 1/8–3/16 inch high at base of young leaves; (3) the slender terminal erect flowering axis bearing many crowded almost stalkless minute greenish white 5-parted flowers less than 1/8 inch long and broad; and (4) slightly fleshy egg-shaped black fruit nearly 1/4 inch long.

Evergreen shrub or small tree to 15 feet high, often with several trunks to 4 inches in diameter, hairless or nearly so. Bark gray, smooth, becoming slightly fissured. The twigs are short and slender.

The alternate leaves have stout reddish petioles 1/8–1/4 inch long. Blades are slightly thick and leathery, not toothed on edges, with reddish midvein, the veins forming a fine network.

Flowers clusters (spikes) are 1½–3 inches long. Flowers are male and female on different trees (dioecious). Male flowers have a short basal tube (hypanthium) and 5 widely spreading calyx lobes 1/16 inch long, 8 white stamens, and rudimentary pistil. Female flowers have small stamens and pistil with 3-angled 1-celled ovary and 3 short styles. The fruit consists of the basal tube (hypanthium) bearing at apex the 5 calyx lobes nearly 1/8 inch long and enclosing a shiny dark brown seed (akene). With flowers in fall and fruit in winter.

Uncommon in dry coastal forests from sea level to 400 feet altitude along south coast of Puerto Rico. Also Mona (rare), Icacos, Vieques, St. Croix, St. Thomas, Little St. James Island, St. John, and Anegada.

PUBLIC FOREST AND PARK.—Guánica; Virgin Islands.

RANGE.—Bahamas, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, St. Martin, Barbuda, and Antigua.

OTHER COMMON NAMES.—wild-grape, whitewood (Virgin Islands); crabwood, bow-pigeon (Bahamas).

Some shrubs or small plants that are similar to this species and called wild-grape in the Virgin Islands have been identified as the hybrid with No. 28, uva de playa or seagrape (*Coccoloba uvifera* (L.) L.), and designated by the formula of the two parents, *Coccoloba krugii* × *uvifera*. The hybrid has leaves intermediate, though variable in size, shape, and thickness between those of the two species. Distinguishing characteristics: (1) ovate to ovate-elliptic leaves 2½–4 inches long and 1¼–3 inches wide or larger on sprouts, blunt to rounded at apex, slightly thickened, oblique and heart-shaped to rounded at base, with a lobe often overlapping petiole of 3/8 inch; (2) flower clusters (narrow racemes) to 8 inches long, finely hairy, the short-stalked flowers less than 1/8 inch long; and (3) elliptic or egg-shaped fruits about 3/8 inch long. Groups of intermediate plants sometimes are found where the two species are absent. RANGE.—Hispaniola, Puerto Rico, St. Croix and Buck Island Reef, St. Thomas, Little St. James, St. John, Virgin Gorda (Gorda Peak), and St. Eustatius.

309. Wild-grape *Coccoloba krugii* Lindau

Fruiting twig (above), twig with female flowers (left), twig with male flowers (lower right), natural size.

310. Uverillo ***Coccoloba microstachya* Willd.**

Uverillo, a small tree common and widely distributed in dry forests, is identified by: (1) short, slender zigzag twigs with enlarged ringed nodes from sheath at leaf base; (2) small broadly elliptic to ovate or nearly round leaves, slightly thickened; (3) terminal flowering axes 1–2 inches or more in length, slender and usually curved downward, remaining after the minute stalkless greenish white flowers have shed; and (4) egg-shaped blackish or dark brown fruits $^3/_{16}$ inch long.

Deciduous or evergreen shrub or small tree to 40 feet high and 5 inches in trunk diameter, much branched. Bark gray, smoothish, becoming rough and deeply furrowed into plates. The inner bark is reddish and tasteless. The short, much branched twigs are gray to light brown with dots (lenticels), finely hairy when young. The bud is formed by a dark red sheath $^1/_8$ inch long, narrow and finely hairy.

The alternate leaves have short yellow-green leafstalk $^1/_8$–$^1/_4$ inch long and a membranous sheath (ocrea) $^1/_8$ inch long forming a ring at node. Blades are $^3/_4$–2 inches long, $^1/_2$–$1^1/_4$ inches broad, rounded or notched at apex, rounded at base, not toothed on edges, becoming hairless or nearly so, turning dark on drying. The upper surface is dull green and the lower surface dull light green, the many small veins inconspicuous but forming a fine network in dry leaves.

The flower clusters (spikes) bear many male and female flowers on different trees (dioecious). Male flowers are less than $^1/_8$ inch long and broad, composed of cuplike base (hypanthium) bearing 5 spreading rounded greenish-white calyx lobes, 8 short stamens, and tiny nonfunctioning pistil. Female flowers have a deeper cup or basal tube bearing 5 calyx lobes, very short nonfunctioning stamens, and pistil with 3-angled ovary and 3 short styles. The egg-shaped fruit is composed of the basal tube bearing 5 calyx lobes at apex and enclosing a blackish seed (akene). Flowering in summer and fall and fruiting in winter.

The wood is light brown and hard.

Common and widespread in moist and dry limestone forests and lower Cordillera forest (serpentine only) from sea level to 2,500 feet but mostly at low altitudes in Puerto Rico and throughout the adjacent islands, large and small. Mona, Muertos, Isla Palominos, Vieques, Culebra, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Guánica, Maricao, Río Abajo, Susúa, Vega, Estate Thomas; Buck Island Reef, Virgin Islands.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, and Anguilla.

OTHER COMMON NAMES.—uverilla, negra loca, uvillo (Puerto Rico); puckout (Virgin Islands).

Formerly referred to *Coccoloba obtusifolia* Jacq., a species of Colombia and Venezuela.

310. Uverillo *Coccoloba microstachya* Willd.

Natural size.

311. Uvera ***Coccoloba pyrifolia* Desf.**

This shrub or small tree confined to Puerto Rico is identified by: (1) narrowly ovate or elliptic leaves 2–4½ inches long and 1–2¼ inches wide; (2) slender twigs ringed and sometimes swollen at nodes with a gray sheath (ocrea) ¼–½ inch long at base of young leaves; (3) the very slender drooping terminal flowering axis often much longer than the leaves bearing many minute stalkless whitish or greenish flowers nearly ⅛ inch long and broad; and (4) slightly fleshy egg-shaped fruit ¼ inch long, changing color from pale green to red to black.

Evergreen, usually a shrub but sometimes a small tree to 25 feet high and 6 inches in trunk diameter, hairless throughout. Bark on small trunks is smooth and gray, the inner bark light brown and almost tasteless. Twigs are gray and slender.

Petioles of the alternate leaves are ¼–½ inch long. Blades are blunt or short-pointed at apex, blunt or rounded at base, not toothed on edges, slightly thick and leathery, the veins inconspicuous on both surfaces, the upper surface green to dark green, and the lower surface light green.

Flower clusters (spikes) are 3–6 inches long or sometimes to 12 inches, bearing many stalkless flowers, male and female on different trees (dioecious). Male flowers have a triangular scale less than 1/16 inch long, a basal tube (hypanthium), 5 calyx lobes, 8 stamens, and rudimentary pistil. Female flowers have a longer basal tube, 5 calyx lobes, small stamens, and pistil with 3-angled 1-celled ovary and 3 short styles. The fruits are composed of the fleshy basal tube (hypanthium) with red juice, bearing the 5 calyx lobes at apex and enclosing 1 large brown seed (akene) nearly ¼ inch long, slightly 3-angled. Flowering irregularly through the year.

The sapwood is whitish and hard.

Locally common in moist coastal and lower Cordillera forests at 100–2,700 feet altitude in Puerto Rico.

PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro.

RANGE.—Puerto Rico only.

This Puerto Rican species was named in 1829 by the French botanist Réné Louiche Desfontaines (1750–1833) in a catalog of the plants cultivated in the botanical garden in Paris.

311. Uvera *Coccoloba pyrifolia* Desf.

Twig with male flowers (left), twigs with fruits and with female flowers (right), natural size.

312. Ortegón *Coccoloba rugosa* **Desf.**

Once seen, this tree of eastern Puerto Rico is not forgotten because of several odd characteristics for easy recognition: (1) the very slender trunk has few or sometimes no branches; (2) the giant nearly round to broadly ovate leaves mostly 9–24 inches in diameter, very strongly wrinkled (rugose) with extremely sunken veins prominent beneath, very thick and brittle, rolled under at margin, hairless on both surfaces, heart-shaped and clasping at base with a large sheath; (3) at the top a conspicuous narrow but stout bright red or crimson flowering axis 1–2½ feet long, bearing on slender stalks numerous small red flowers less than 3/16 inch long; and (4) the many egg-shaped or rounded red fruits ¼ inch long, slightly fleshy.

A small evergreen tree to 30 feet in height and 5 inches in trunk diameter, with very narrow, erect, polelike, slightly angled axis and thin narrow crown, hairless throughout. The bark is light brown or gray and fissured, with faint rings at the swollen nodes. Inner bark also light brown is slightly bitter. The green twigs are stout, more than ⅝ inch in diameter, slightly flattened, with usually 12 prominent vertical ridges and with large white pith. At end is an oblong flat yellow-green bud 2–2½ inches long rounded at apex, formed by the leaf sheath (ocrea).

The alternate stalkless leaves are borne along twigs for a distance of several feet back of apex. At the base of each leaf is a very large firm light green to brown sheath (ocrea), which forms a clasping ring 1½–2½ inches high, split into 2 oblong rounded lobes, and which upon falling makes a ring scar. The blade is rounded at apex, dull green above, and pale light green beneath.

The flower cluster (raceme) consists of the stout minutely hairy axis and finely hairy flowers clustered together on slender dark red stalks ¼–½ inch long, male and female on different trees (dioecious). Female flowers in clusters of 2–6 have a funnel-shaped basal tube (hypanthium) more than 1/16 inch long bearing 5 rounded red calyx lobes 1/16 inch long and usually 8 (6–12) minute dark red sterile stamens and partly enclosing the pink pistil more than ⅛ inch long, which is composed of 3-angled ovary and 3 slender protruding styles with flattened stigmas. Male flowers have 8 larger stamens protruding beyond the calyx lobes and a nonfunctional small pistil with ovary and 3 small styles. The fruit is composed of the thin red fleshy basal tube (hypanthium) with sepals at apex, enclosing 1 shiny brown, pointed, 3-angled seed (akene) 3/16 inch long. Flowering irregularly, recorded with flowers from April to September and with fruits from July to September.

The wood is white and very hard. It is resistant to attack by dry-wood termites but is little used except for stakes.

The leaves are used for ornament. Formerly a portion of the axis with the stiff durable leaves brilliantly painted with gilt or silver served as a room decoration in many Puerto Rican homes. The plants are sparingly grown as ornamentals.

Local and uncommon in moist coastal and lower Luquillo forests of eastern Puerto Rico from sea level to 1,800 feet altitude. Collected years ago at several places but now less common following clearing of forests. The largest known areas of this species are in Barrio Maizales above Naguabo in Luquillo Mountains and on coastal hills near Ceiba and Humacao. Another place where the trees could be seen until a few years ago was a patch of woods on the west shore of San José Lagoon in Santurce, since destroyed by the growing city. Trees still persist at one area near Cataño. Recorded also from St. Thomas more than a century ago.

PUBLIC FOREST.—Luquillo.

RANGE.—Restricted to eastern Puerto Rico, and formerly recorded from St. Thomas.

Named in 1815 and described with the preceding species in 1829 by the French botanist Réné Louiche Desfontaines (1750–1833) in a catalog of the plants cultivated in the botanical garden in Paris.

312. Ortegón *Coccoloba rugosa* Desf.

Twig with male flowers (left), one-third natural size; female flowers (upper right), fruits (center right), two-thirds natural size.

313. Uvero de monte ***Coccoloba sintenisii* Urban**

Uvero de monte, which is known only from mountains of Puerto Rico is distinguished by: (1) the oblong stiff and leathery leaves 5–8 inches long and 3½–5 inches wide, short-pointed at apex and notched or heart-shaped at base; (2) stout twigs ringed at nodes with sheath (ocrea) ¼–¾ inch long at base of young leaves; (3) stout reddish flower stalks 1½–5 inches long bearing many bright red flowers ⅛ inch long on slender red stalks of ⅛–3/16 inch; and (4) red to brown egg-shaped fleshy fruits 5/16–⅜ inch long.

Evergreen small tree 20 feet high and 6 inches in trunk diameter, reported to reach 30 feet and 12 inches, hairless throughout. The bark is gray or light brown and fissured, the inner bark light brown and almost tasteless. Twigs are gray or light brown and stout, with rings at nodes.

The alternate leaves have stout petioles ½–1¼ inches long. Blades are thick, not toothed on edges, with midvein in a groove, with few side veins, the upper surface shiny green, and the lower surface dull blue green.

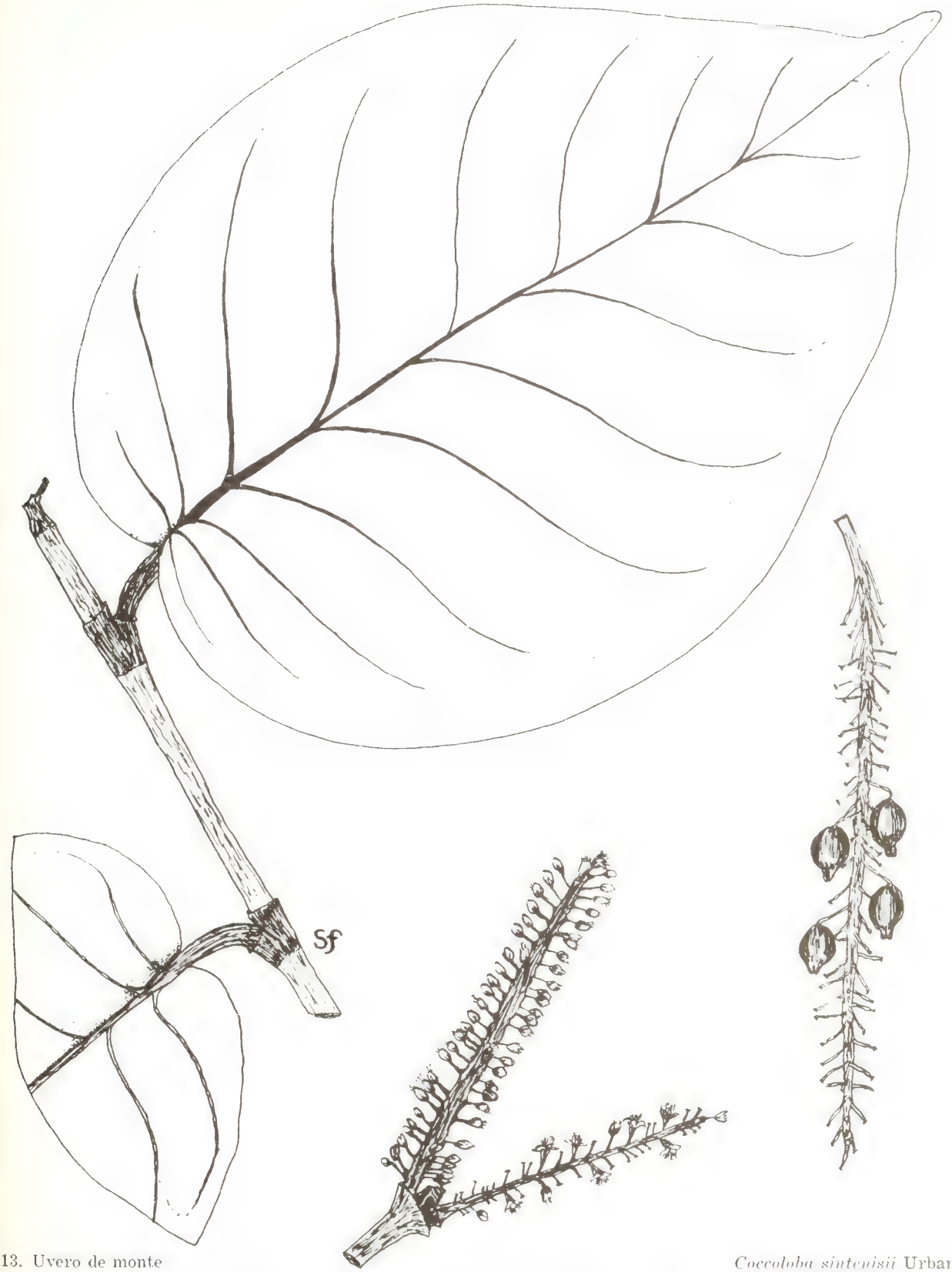
Flower clusters (racemes) on side twigs or below the leaves bear many bright red male and female flowers on different trees (dioecious). Male flowers have a rounded scale less than 1/16 inch long, a short red basal tube (hypanthium) and 5 red calyx lobes, 8 stamens, and rudimentary pistil. Female flowers have a longer basal tube, 5 calyx lobes, 8–10 small stamens and pistil with 3-angled 1-celled ovary and 3 short styles. The axis of the fruit clusters becomes as much as 6–8 inches long and 3/16–¼ inch in diameter. The red fruits are composed of the fleshy basal tube (hypanthium), 5 calyx lobes at apex, and 1 large brown seed (akene) nearly ¼ inch long, slightly 3-angled. With flowers and fruits from spring to fall.

The sapwood is whitish and hard.

Locally common in upper Cordillera forest at 1,000–2,800 feet altitude in western Puerto Rico from Aibonito to Maricao. A form near Coamo has white flowers on a whitish axis.

PUBLIC FORESTS.—Maricao, Susúa.

RANGE.—Mountains of central and western Puerto Rico.



313. Uvero de monte *Coccoloba sintenisii* Urban

Leafy twig (above), male flowers (below), fruits (lower right), natural size.

314. *Coccoloba tenuifolia* L

This rare shrub or small tree was first found in Puerto Rico in 1963 by one of the authors. It is recognized by: (1) twigs with slightly enlarged ringed nodes bearing at base of leaf a sheath (ocrea) to ½ inch long; (2) elliptic leaves 1½–4½ inches long and ¾–4 inches wide, thin, the petioles attached above base of sheath; (3) many small flowers, less than ⅛ inch long on stalks of 1/16 inch in slender terminal clusters of 3–7 inches; and (4) egg-shaped to rounded fruits nearly ¼ inch long.

An evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter. Twigs slender, finely hairy when young.

The leaves are alternate but mostly on short side twigs and crowded. The minutely hairy petioles ¼–⅜ inch long are attached above base of sheath (ocrea). Blades are short-pointed at apex, rounded or slightly notched at base, not toothed on edges, the upper surface shiny green and hairless, and the lower surface paler and slightly hairy along veins and with tufts of hairs in vein angles.

Flower clusters (racemes) with slende finely hairy axis bear many small flowers, mal and female on different trees (dioecious). Mal flowers 1–4 in a cluster, are composed of minut basal tube (hypanthium), 5 calyx lobes, and spreading stamens. Female flowers borne singl have larger basal tube, 5 calyx lobes, minut nonfunctional stamens, and pistil with ovar and 3 styles. The fruits consist of basal tub (hypanthium) with calyx lobes at apex and seed (akene).

Known in Puerto Rico only from mois coastal forest along coastal cliffs to 300 fee altitude near old railroad tunnel at Río Guaja taca near Quebradillas.

RANGE.—Bahamas, Cuba, Jamaica, an Puerto Rico.

OTHER COMMON NAME.—Bahama pigeon plum (Bahamas).

BOTANICAL SYNONYM.—*Coccoloba bahamen sis* Britton.

314. *Coccoloba tenuifolia* L.

Twig with female flowers (above), fruiting twig (lower right), natural size.

FOUR-O'CLOCK FAMILY (NYCTAGINACEAE)

Shrubs, woody vines, and trees in the tropics and herbs in temperate climates, known by: (1) leaves mostly opposite, simple, entire, without stipules; (2) flowers small or minute, in branched clusters (cymes), sometimes with showy bracts, bisexual or male and female on different plants (dioecious) or the same plant (monoecious), regular, with tubular 5-lobed calyx often showy, no corolla, 1–30 stamens separate or united, and pistil with superior 1-celled ovary containing 1 ovule, and long style; and (3) fruit an akene enclosed by the persistent, sometimes fleshy calyx. Also vol. 1, p. 88.

Key to species

A. Leaves small, narrowly oblong, ¼–1⅛ inches long, almost stalkless, mostly whorled and crowded on short side twigs but alternate on long twigs—317. *Neea buxifolia.*

AA. Leaves, larger, broader, opposite.

B. Leaves elliptic or nearly round, rounded or short-pointed at both ends, hairy at least when young; fruit dry, narrow, with 5 rows of dotlike glands—*Pisonia.*

C. Leaves about half as broad as long, the lower surface densely fine hairy—31. Corcho bobo, *Pisonia albida* (Heimerl) Britton.

CC. Leaves nearly as broad as long, rusty brown hairy when young but becoming hairless or nearly so—32. Corcho blanco, water mampoo, *Pisonia subcordata* Sw.

BB. Leaves elliptic to obovate or oblong, mostly short-pointed at apex (except No. 315), hairless; fruits cylindric, fleshy, red or turning to black—*Guapira.*

D. Leaves ½–1½ inches long, oblong or elliptic, rounded or slightly notched at apex.—315. *Guapira discolor.*

DD. Leaves larger.

E. Young twigs, petioles, flower stalks, and flowers with minute reddish hairs; leaves elliptic, mostly 2½–5 inches long, forming prominent network of many small veins upon drying—316. *Guapira obtusata.*

EE. Young twigs and petioles hairless; leaves obovate or elliptic, usually broadest beyond middle, 2–6 inches long, slightly thick and succulent—33. Corcho, black mampoo, *Guapira fragrans* (Dum.-Cours.) Little (*Torrubia fragrans*).

315. Barrehorno — *Guapira discolor* (Spreng.) Little

Shrub or small tree on Desecheo and Mona Islands and found near Guánica, Puerto Rico. Identified by: (1) opposite, small oblong or elliptic leaves ½–1½ inches long and ⅜–1 inch wide, sometimes larger, rounded or slightly notched at apex; (2) many clustered cylindric fleshy 1-seeded fruits more than ¼ inch long, bright red.

Evergreen shrub or small tree to 20 feet high, often with several trunks to 5 inches in diameter, spreading and sometimes leaning. The bark is gray and smooth, becoming slightly cracked into small rectangular plates. Inner bark has a thin green outer layer and light brown fibrous beneath, almost tasteless. Twigs light gray, hairless, brittle.

The opposite hairless leaves have slender petioles ¼–⅜ inch long. Blades are short-pointed at base, not toothed on margins, slightly thickened, without visible veins except midrib, dull green on upper surface and paler beneath.

Flowers are male and female on different trees (dioecious) few to many in terminal and lateral branched clusters (panicles) ½–1½ inches long and broad. The flowers are small, greenish, minutely hairy or almost hairless, stalkless or nearly so. Male flowers are composed of a funnel-shaped 5-toothed calyx ⅜ inch long and 6–10 longer stamens. Female flowers have a tubular 5-toothed calyx ⅛ inch long and pistil with ovary, slender style, and much branched stigma. The fruit (anthocarp) consists of the red fleshy calyx with 5 minute lobes at apex and within a brown 10-ridged oblong dry fruit and 1 seed. With flowers in spring and summer and with fruits in summer and fall.

The sapwood is light brown and soft.

Rare and scattered in the dry coastal forest from sea level to 700 feet altitude on Desecheo and Mona Islands. Collected also at Punta Montalva near Guánica in the southwestern part of Puerto Rico but not known elsewhere on the island.

RANGE.—Puerto Rico, Desecheo, Mona, Hispaniola, Cuba, Jamaica, and Grand Caymans. Also a variety at Navassa (U. S.).

OTHER COMMON NAME.—barrehorno (Cuba).

BOTANICAL SYNONYMS.—*Pisonia discolor* Spreng., *Torrubia discolor* (Spreng.) Britton.

315. Barrehorno *Guapira discolor* (Spreng.) Little

Twig with male flowers (above), fruiting twig (lower left), twig with female flowers (right), natural size.

316. Corcho prieto ***Guapira obtusata*** **(Jacq.) Little**

A tree of western mountains of Puerto Rico characterized by: (1) minute dark reddish hairs on young twigs, buds, petioles, branches of flower clusters, and flowers; (2) opposite elliptic leaves slightly thickened and leathery, forming a prominent network of many small veins upon drying; and (3) many clustered elliptic red fruits ¼ inch long, fleshy and 1-seeded.

Small to medium-sized deciduous tree to 60 feet high and 14 inches in trunk diameter. Bark gray or light brown, smoothish, finely fissured. Inner bark is light brown or whitish, slightly bitter. The green twig becoming gray ends in a pointed bud 1/16–⅛ inch long, both covered with minute dark reddish hairs.

The opposite leaves have slender petioles mostly ½–1 inch long, sometimes shorter. Blades are broadly to narrowly elliptic, mostly 2½–5 inches long and 1¼–2½ inches wide, slightly thickened and leathery, hairless, short-pointed at base, not toothed on edges, and short-pointed or blunt at apex, slightly shiny green or yellow green, and paler green beneath.

Many small male and female flowers are borne on different trees (dioecious), nearly stalkless, greenish with reddish hairs, in much branched clusters 1½–4 inches long and broad at or near ends of twigs. Male flowers have funnel-shaped 5-toothed calyx ⅛ inch long and 6–8 stamens about twice as long. Female flowers have a narrow tubular 5-toothed calyx ⅛ inch long and pistil with ovary, slender style, and much branched stigma. The fruit (anthocarp) is composed of the red fleshy calyx with 5 minute lobes at apex and within a 10-ridged dry fruit and 1 oblong seed 3/16 inch long. Flowering in spring and summer and maturing fruits in summer.

The wood is light brown with darker streaks and hard.

Uncommon to rare in lower Cordillera and moist limestone forests, also on serpentine, at 200–2,800 feet altitude in western mountains of Puerto Rico.

PUBLIC FORESTS.—Cambalache, Guajataca, Guánica, Maricao, Río Abajo, Susúa.

RANGE.—Puerto Rico, Hispaniola, Cuba, Jamaica, and Bahamas; bois cassave sylvestre (Haiti).

OTHER COMMON NAMES.—corcho, corcho blanco (Puerto Rico); vibora, mala mujer (Dominican Republic); sapo, macagüey (Cuba); broad-leaved blolly (Bahamas).

BOTANICAL SYNONYMS.—*Pisonia obtusata* Jacq., *Torrubia obtusata* (Jacq.) Britton.

Britton and Wilson (*10*) did not list this species from Puerto Rico, though Cook and Collins (*13*) did. Originally named from Bahamas, it reaches its eastern limit here.

316. Corcho prieto *Guapira obtusata* (Jacq.) Little

Twig with male flowers (upper left), twig with female flowers (upper right), fruiting twig (below), natural size.

317. ***Neea buxifolia*** **(Hook. f.) Heime**

This rare shrub or small tree is easily recognized by: (1) very slender light gray twigs; (2) small narrowly oblong leaves $\frac{1}{4}$–$1\frac{1}{8}$ inches long, $\frac{1}{8}$–$\frac{5}{16}$ inch wide, mostly whorled and crowded on very short lateral twigs but alternate on long twigs; (3) flowers male and female on different plants, small, light yellow, borne singly at leaf bases; and (4) elliptic red fruits $\frac{1}{4}$ inch long.

Evergreen shrub or rarely small tree to 15 feet high (reported to 25 feet) and 3 inches in trunk diameter, with few slender spreading branches and without a definite crown. Bark gray, smooth, the inner bark greenish and whitish, bitter. The very slender light gray twigs have minute brown hairs when young and bear rounded leaf scars on raised bases.

The leaves have very slender short leafstalks less than $\frac{1}{16}$ inch long from a raised base on twig. Blades are rounded at apex, short-pointed at base, hairless, slightly thickened, without visible side veins, the upper surface shiny green, the lower surface dull light green.

Flowers are male and female on differe plants (dioecious), borne singly at leaf base hanging down on short stalks $\frac{1}{16}$ inch lon Male flowers have a narrowly cylindric tubula hairy calyx $\frac{3}{16}$ inch long, 5-toothed at ape with 2 hairy scales at base, containing 5–8 u equal stamens less than $\frac{3}{16}$ inch long and i side the tube. Female flowers have tubula 5-toothed calyx, with 3 hairy scales at base, e closing pistil with ovary and short style. Th fruit (anthocarp) is red, light green whe immature, with 5-toothed calyx at ape slightly fleshy, 1-seeded. Flowering in sprin and summer and maturing fruits in summer.

Wood whitish, soft.

Uncommon in moist limestone forest at 200 1,500 feet altitude in limestone hills of norther Puerto Rico. Also Piñeros, Culebra, S Thomas, and St. John.

PUBLIC FORESTS AND PARK.—Cambalach Guajataca, Río Abajo, Vega; Virgin Islands.

RANGE.—Known only from Puerto Rico an the Virgin Islands.

317. *Neea buxifolia* (Hook. f.) Heimerl

Leafy twig (left), twig with female flowers (right), natural size.

MOONSEED FAMILY (MENISPERMACEAE)

Woody vines, also few shrubs, herbs, and small trees, known by: (1) leaves alternate, simple, mostly entire, sometimes palmately lobed, palmate-veined, without stipules; (2) minute greenish flowers in branched clusters (cymes), male and female mostly on different plants (dioecious), regular, with usually 6 sepals and 6 smaller petals separate or unitec stamens mostly 6 and opposite petals, and 3– pistils with superior 1–celled ovary containin 2 ovules, and stigma; and (3) fruit a drupe o akene, with seed curved in form of crescent o moon.

318. *Hyperbaena laurifolia* (Poir.) Urba

This rare woody vine or sometimes a small tree of northern and southwestern limestone hills of Puerto Rico is characterized by: (1) oblong to lanceolate leaves, thick, leathery, and brittle, with very fine network of veins on both surfaces when dry, the petioles enlarged below blade; (2) minute greenish yellow flowers male and female in separate branched clusters at leaf bases; and (3) rounded but slightly flattened fruit ¾–1 inch in diameter, blackish, fleshy, with large crescent-shaped or moonlike stone.

Evergreen woody vine or small tree to 15 feet high and 2 inches in trunk diameter. The twigs are stiff, slender, and hairless.

The alternate leaves have leafstalks ½–¾ inch long, enlarged in the ¼ inch below blade, without stipules. Blades are 3–6 inches long and 1–2 inches wide, short-pointed or blunt at apex and rounded at base, not toothed on edges, thick and leathery, hairless, the upper surface shiny green, the lower surface paler dull green.

Flower clusters (panicles) to 2 inches lon at leaf bases contain many tiny flowers on fine rusty hairy branches, male and female o different plants (dioecious). Male flowers les than ⅛ inch across are composed of 6 sepal in 2 series, the inner larger and nearly 1/16 inc long, 6 petals shorter than sepals, and 6 shor stamens. Female flowers in short cluster (racemelike), consisting of 6 sepals, 6 petals 6 minute nonfunctional stamens, and 3 pistil with ovary and hooklike style. The frui (drupe) contains thin flesh and large crescent shaped or moonlike stone and seed. Flowerin in spring and with fruits in spring and summe

Rare in northern limestone region at 200 600 feet altitude near Bayamón and Río Abaj and in San José Lagoon, northern Puerto Ric and near Cabo Rojo in southwestern part. Als St. Thomas.

PUBLIC FORESTS.—Guajataca, Río Abajo.

RANGE.—Puerto Rico, St. Thomas, and Mont serrat.

MAGNOLIA FAMILY (MAGNOLIACEAE)

Trees and shrubs, known by: (1) leaves alternate, simple, entire, mostly with large stipules that form the bud and leave ring scars at nodes; (2) flowers often large and showy, frequently solitary, bisexual, regular, with 3 to many sepals, 6 to many petals commonly white, many stamens in spiral on elongated axis, an in a spiral many simple pistils with 1-celle ovary and 1 to few ovules; and (3) fruit c many follicles or berries often united like cone. Vol. 1, p. 94.

Key to species (Nos. 34–35)

A. Leaves broadly elliptic to nearly round, abruptly short-pointed, hairless—34. Jagüilla, *Magnolia portoricens* Bello.

AA. Leaves ovate or elliptic, short- or long-pointed, the lower surface silky gray green with fine hairs—35. Laur sabino, *Magnolia splendens* Urban.

318. *Hyperbaena laurifolia* (Poir.) Urban

Twig with male flowers (upper left), fruiting twig (below), natural size.

ANNONA FAMILY (ANNONACEAE)

Small to medium-sized trees and shrubs, known by: (1) leaves alternate, commonly in 2 rows, simple, entire, sometimes aromatic and with gland dots, without stipules; (2) flowers generally solitary, large, bisexual, regular, composed of 3 sepals, 6 petals in 2 series of unequal size, and on the axis many stamens in a spiral and few to many separate pistils with superior 1-celled ovary containing 1 to many ovules, style, and stigma; and (3) fruits, often stalked, berries, follicles, or aggregate, sometimes edible. Also vol. 1, p. 98.

Key to species

A. Fruit 1 from a flower, from many pistils united, edible (except No. 36 and doubtfully No. 320).
  B. Flowers with petals united at base, the outer 3 forming thickened wings; fruit rounded, 2½–4 inches in diameter, with many conic tubercles—324. *Rollinia mucosa.*
  BB. Flowers with petals distinct, not winged—*Annona.*
    C. Leaves with tiny pockets on lower leaf surface where side veins join midrib; fruits bearing many fleshy spines.
      D. Leaves broadest at middle; fruit rounded, with short straight spines, not edible—36. Guanábana cimarrona, wild soursop, *Annona montana* Macfadyen.
      DD. Leaves broadest beyond middle; fruit elliptic or egg-shaped, with long curved spines, edible—37. Guanábana, soursop, *Annona muricata* L.*
    CC. Leaves without pockets; fruits smooth.
      E. Fruit composed of many rounded tubercles—39. Anón, sugar-apple, *Annona squamosa* L.*
      EE. Fruit not tubercled.
        F. Fruit egg-shaped, almost tasteless; flowers nearly as broad as long—320. *Annona glabra*
        FF. Fruit rounded or heart-shaped, sweetish; flowers narrow, about twice as long as broad.
          G. Leaves ovate to elliptic, velvety hairy beneath—319. *Annona cherimolia.**
          GG. Leaves lanceolate to oblong, finely hairy beneath when young—38. Corazón, custard apple, *Annona reticulata* L.*
AA. Fruits several to many from a flower, separate, inedible.
  H. Flowers with 6 very narrow long-pointed drooping petals 3–5 inches long; fruits 8–15 long-stalked elliptic berries ¾–1 inch long—40. Ilán-ilán, ylang-ylang, *Cananga odorata* (Lam.) Hook. f. & Thoms.*
  HH. Flowers with 6 petals less than 1 inch long; fruits mostly short-stalked.
    I. Flowers with petals ½–⅞ inch long; fruits many—*Guatteria.*
      J. Leaves oblong, 1½–3 inches long, short-pointed or rounded at apex, thick and leathery—41. Hayaminga, *Guatteria blainii* (Griseb.) Urban.
      JJ. Leaves narrowly elliptic, 3–8 inches long, long-pointed at apex, slightly thickened—321. *Guatteria caribaea.*
    II. Flowers with petals 3/16–5/16 inch long; fruits several or few—*Oxandra.*
      K. Leaves oblong-elliptic, 3½–8 inches long; flowers 5/16 inch long; fruits several, ⅝ inch long, long-stalked—323. *Oxandra laurifolia.*
      KK. Leaves lance-elliptic, 1½-3¾ inches long; flowers 3/16 inch long; fruits few (or 1), nearly ½ inch long, almost stalkless—322. *Oxandra lanceolata.*

319. Chirimoya, cherimoya — *Annona cherimolia* Mill.[2]

Cherimoya is planted occasionally as a fruit tree but is less common than its relatives. Distinguished by: (1) yellow-brown hairs on young twigs and leaves; (2) leaves mostly ovate to elliptic, blunt-pointed at apex and rounded at base, velvety hairy beneath, alternate and in 2 rows; (3) flowers greenish yellow, 1–1¼ inches long, with 3 narrow outer petals, velvety brownish hairy; and (4) fruit rounded to conelike or heart-shaped, about 3–4½ inches in diameter, the surface often marked with small protuberances separated by line borders of individual fruits.

A small deciduous (?) tree to 25 feet high. Twigs finely hairy.

The leaves hang down in 2 rows along horizontal twigs. Petioles ¼–½ inch long, finely hairy. Blades are mostly 3–6 inches long and 1½–3½ inches wide, sometimes larger, slightly hairy above, with many straight parallel lateral veins.

The large fragrant flowers are borne singly or 2 or 3 on short nodding hairy stalks often opposite a leaf. There are 3 narrow outer petals ⅝–1¼ inches long, greenish yellow and velvety hairy, within pale yellow with a purple spot at base, 3 inner petals very small and scalelike, usually pinkish; many crowded minute stamens; and many tiny pistils crowded on conical axis.

The aggregate fruit is variable in shape and composed of many united pistils, each usually with a tubercle from the style or the surface smooth with a network formed by borders of individual fruits. From each flower there is an oblong slightly flattened brown or black

319. Chirimoya, cherimoya *Annona cherimolia* Mill.*

Flowering twig, natural size.

seed about ⅝ inch long. The pulp, which separates easily from the seeds, is white and has a pleasantly acid taste.

Uncommon as a fruit tree in Puerto Rico, mostly in mountains, and grown experimentally in St. Croix. Better adapted to subtropical regions in mountains or northward than to the lowland tropics.

RANGE.—Native apparently of the Andes from Colombia to Peru and Bolivia but introduced early and naturalized north to Centra America and Mexico. Planted north to south ern Florida, southern California, south t Brazil and Chile, in the West Indies, Hawai and in the Old World tropics.

OTHER COMMON NAMES.—chirimoya, cheri moya, anona (Spanish); anona blanca, anon poshte (El Salvador); cherimoya (English) cachiman la Chine (Haiti). The common nam chirimoya is applied also to related species.

320. Corazón cimarrón, pond-apple ***Annona glabra*** L

Corazón cimarrón or pond-apple, which is uncommon in coastal swamps back of the mangroves, is recognized by: (1) shiny leathery elliptic leaves 3–6 inches long and 1¼–2¾ inches wide; (2) flowers solitary, almost round, whitish, about ¾ inch wide, with 6 large fleshy petals of 2 sizes; and (3) large egg-shaped fruits 2¾–5 inches long, smooth, pale yellow with brown spots, edible but almost tasteless.

Small tree to 20 feet high and 6 inches in trunk diameter, with spreading crown, deciduous. The trunk becomes swollen at base and sometimes has buttresses. Bark dark reddish brown, fissured and scaly. Twigs brown or yellow, becoming warty, hairless.

The leaves are alternate in 2 rows on stout petioles about ½ inch long. Leaf blades are short-pointed at apex, rounded at base, not toothed on edges, hairless, shiny green on upper surface and pale beneath.

Flowers open from a triangular bud on a stout lateral drooping stalk. There are 3 pointed green sepals about 3/16 inch long; 6 fleshy petals in 2 series, the 3 outer larger, ⅝–¾ inch long, concave, and short-pointed with a red dot near the base within, and 3 inner smaller; many stamens ⅛ inch long; and many pistils less than ⅛ inch long. The aggregate fruit is formed from the many pistils and composed of light yellow aromatic pulp, which is almost tasteless. There are many elliptic shiny brown seeds ½–⅝ inch long. Flowering in spring and maturing fruits in summer.

The wood is light brown with yellow streaks, soft, lightweight (specific gravity 0.5), weak, and not durable. The lightweight wood, cork-like, especially that of the roots, has been employed for floats of fishing nets and for bottle stoppers.

The fruits resemble those of No. 38, corazó or custard-apple, *Annona reticulata* L., an other related species cultivated for their del cious fruits. However, fruits of this wild tre are seldom eaten by people because they ar almost tasteless.

Uncommon in coastal swamps and alon streambanks back of the mangroves in fres water almost at sea level around the coast Puerto Rico and through the Virgin Island Recorded from Vieques, St. Croix, St. Thoma St. John, Tortola, Jost Van Dyke, and Virgi Gorda. Not found on Mona or Desecheo.

PUBLIC FORESTS AND PARK.—Aguirre, B querón, Cambalache, San Juan; Virgin Island

RANGE.—Southern Florida including Flo ida Keys and widespread from Bahama through West Indies. Also from souther Mexico along Atlantic coast to Brazil and alor Pacific coast to Ecuador including Galápag Islands. Also coast of western Africa.

OTHER COMMON NAMES.—cayur, coyu corcho (Puerto Rico); pond-apple, corkwo (Virgin Islands); mamón de perro, anón de rí bagá, guanábana cimarrona (Dominican R public); bagá, palo bobo (Cuba); corcho, pa de corcho, xmaac (Mexico); anonillo (Guat mala); anona (Honduras); guanábana (Nic ragua); guanábana silvestre (Costa Rica anón de puerco (Panama); mayós (Colombia anon liso, chirimoya cimarrona, guanábar cimarrón, guanábano bobo (Venezuela); anor del campo (Ecuador); pond-apple, alligato apple, custard-apple (United States); cor wood, monkey-apple, pond-apple (English courasol, courasotte, sweet-sop (Dominica bobwood, corkwood, alligator-apple (Briti Honduras); corossol marron, mammi (Haiti); kayuda (Dutch Antilles); araticu do brejo (Brazil).

BOTANICAL SYNONYM.—*Annona palustris*

320. Corazón cimarrón, pond-apple *Annona glabra* L.

Flowering twig (above), fruiting twig (below), two-thirds natural size.

321. Haya blanca ***Guatteria caribaea*** **Urban**

Haya blanca is a small to medium-sized tree of moist forests, characterized by: (1) narrowly elliptic leaves 3–8 inches long and 1–3 inches wide, long-pointed at apex, slightly thickened, alternate in 2 rows; (2) flowers single at leaf bases, about ¾ inch long, with 6 oblong whitish fleshy petals; and (3) clusters of several to many short-stalked oblong fruits about ¾ inch long and ¼ inch wide, 1-seeded, from a flower.

Evergreen small to medium-sized tree 20–70 feet high and 6–10 inches in trunk diameter, with spreading horizontal branches. The bark is smooth and gray, the inner bark light brown and slightly spicy. Twigs are green and finely hairy when young, becoming dark brown, slightly zigzag.

The alternate leaves have short petioles ⅛–¼ inch long. Blades are short-pointed at base, not toothed on edges, the upper surface shiny dark green and hairless with faint side veins, and the lower surface dull light green and slightly hairy or almost hairless.

The fragrant flowers are composed of a slender stalk about ½ inch long; 3 broad hairy sepals ⅛ inch long; 6 oblong thickened finely hairy petals ⅜–⅝ inch long; many crowded short stamens less than 1/16 inch long; and many small pistils less than ⅛ inch long, each with a 1–celled 1–ovuled ovary. With flowers from spring to fall and with fruits from summer to winter.

The sapwood is yellow or light brown. The hard heavy wood has served for posts. Elsewhere the wood has been used for lumber, and rope has been made from the fibrous bark.

Uncommon to rare in moist limestone, lower Luquillo, and upper and lower Cordillera forests at 500–4,000 feet altitude in Puerto Rico. Also in mountain forest of Sage Mountain, Tortola. Reported from St. Thomas more than a century ago.

PUBLIC FORESTS AND PARK.—Luquillo, Río Abajo, Susúa, Toro Negro; Sage Mountain.

RANGE.—Puerto Rico, Tortola, St. Kitts, Guadeloupe, Dominica, Martinique, St. Lucia, and Grenada.

OTHER COMMON NAMES.—cachiman grand bois, corosol grand bois (French); mahot l'anglais, corossolier, corossolier montagne, mahot noir (Martinique); maho noir, bois violon (Dominica).

BOTANICAL SYNONYM.—*Cananga caribaea* (Urban) Britton.

321. Haya blanca *Guatteria caribaea* Urban

Fruiting twig (above), flowering twig (below), natural size.

322. Haya prieta, lancewood ***Oxandra lanceolata*** **(Sw.) Baill.**

Lancewood of this species is very rare in western Puerto Rico. Its distinguishing characters are: (1) lance-elliptic leaves $1\frac{1}{2}$–$3\frac{3}{4}$ inches long and $\frac{3}{4}$–$1\frac{1}{2}$ inches wide, alternate in 2 rows; (2) flowers mostly single and almost stalkless at leaf bases, about $\frac{3}{16}$ inch long, with 6 elliptic petals; and (3) few (or 1) almost stalkless elliptic reddish berries nearly $\frac{1}{2}$ inch long and $\frac{5}{16}$ inch wide from a flower, 1-seeded. From No. 323, yaya lancewood, *Oxandra laurifolia* (Sw.) A. Rich., this species is separated by its shorter lance-shaped leaves, smaller flowers, and smaller, stalkless fruits.

Small to medium-sized tree to 50 feet in height. The bark is gray and fissured. Twigs slender, slightly zigzag, gray brown, hairless.

The alternate hairless leaves have very short petioles about $\frac{1}{16}$ inch long. Blades are short-pointed or rounded at base, not toothed on edges, long-pointed at apex, gland dotted, forming a dense network of fine veins.

The flower consists of 3 rounded sepals about $\frac{1}{16}$ inch long; 6 elliptic petals the 3 outer $\frac{3}{16}$ inch long and the 3 inner slightly shorter; many stamens ending in a long tapering appendage beyond the anther; and many pistils with 1-celled ovary, 1 ovule, short style, and enlarged stigma.

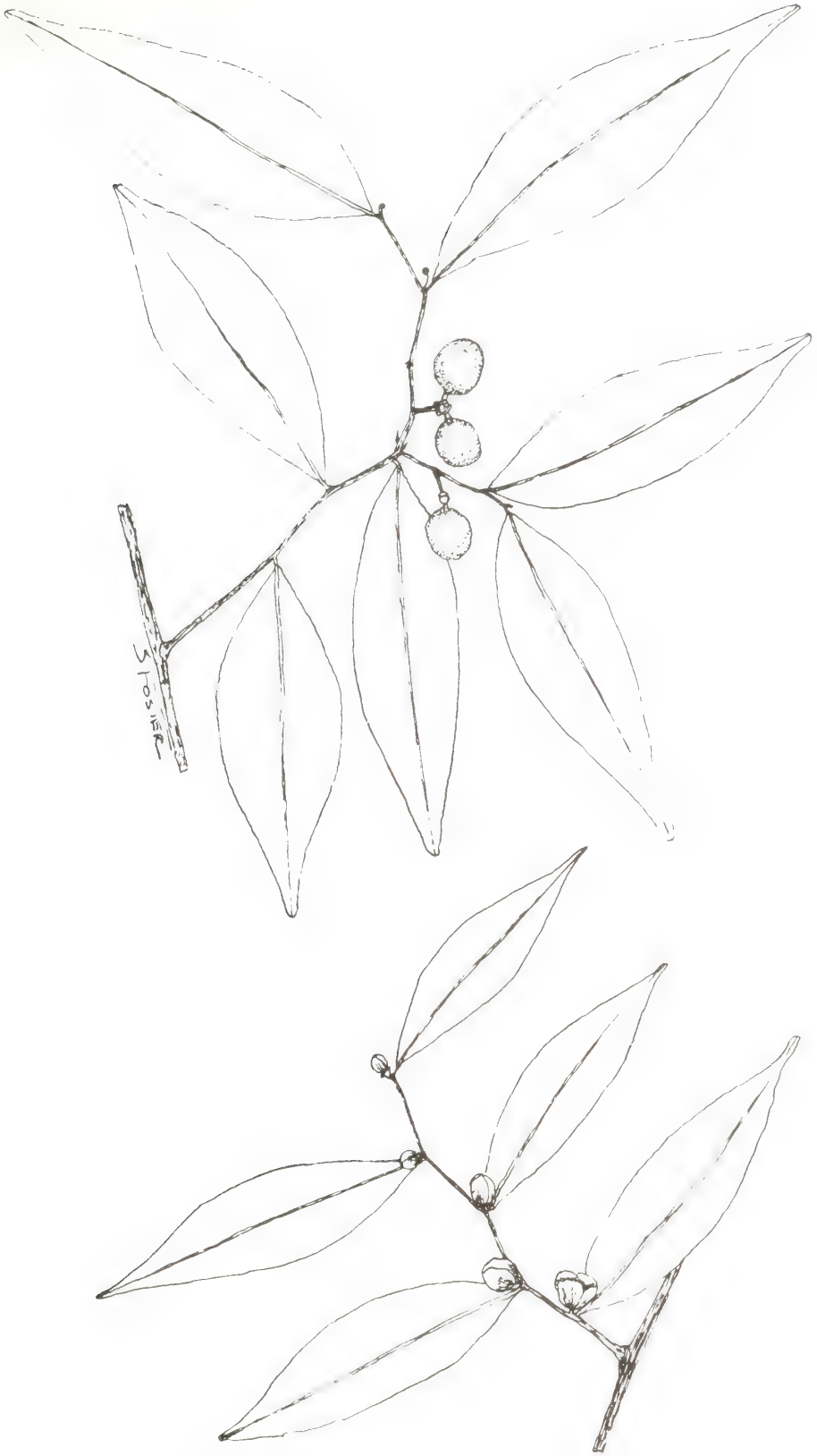
The light yellow wood is described as very fine textured, very strong, durable, elastic, and extremely hard, equaling boxwood. Formerly it was imported into England from Jamaica as "lancewood spars" for carriages. Other uses elsewhere are general turnery, fishing rods, poles, and masts.

It is reported that hogs relish the fruits where the trees are common.

Very rare in woods and thickets near Quebradillas and Cabo Rojo, both in western Puerto Rico, collected nearly a century ago by P. Sintenis and reported by Britton and Wilson (*10*). Collected in 1971 east of Cabo Rojo, where locally common, by one of the authors.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—haya blanca (Puerto Rico); yaya (Dominican Republic, Cuba); yaya, yaya prieta, yaya, yaya boba macho (Cuba); lancewood (English); black lancewood (Jamaica); bois de lance (Haiti).



322. Haya prieta, lancewood *Oxandra lanceolata* (Sw.) Baill.

Fruiting twig (above), flowering twig (below), natural size.

323. Yaya, lancewood ***Oxandra laurifolia*** **(Sw.) A. Rich.**

This species of lancewood is uncommon in the Luquillo Mountains. It is identified by: (1) oblong-elliptic leaves 3½–8 inches long and 1¼–2½ inches wide, long-pointed at both ends, brittle, alternate and spreading in 2 rows; (2) flowers few or 1 at leaf bases, about 5/16 inch long, with 6 spreading oblong white petals; and (3) several long-stalked elliptic purplish black berries ⅝ inch long and ⅜ inch broad from a flower, 1-seeded.

Small evergreen tree 30 feet high and 8 inches in trunk diameter, elsewhere becoming a large tree. Twigs green, slender, slightly zigzag, finely hairy.

The alternate leaves have short stout petioles about ⅛–¼ inch long. Blades are soft hairy beneath when young, becoming hairless, slightly thickened and leathery, not toothed on edges, dark green above and light green beneath.

The short-stalked flowers are composed of 3 sepals 1/16 inch long; 6 oblong white petals ¼–5/16 inch long, the outer 3 slightly longer; many stamens nearly ⅛ inch long ending in a long tapering appendage beyond the anther; and many pistils 1/16 inch long, consisting of hairy 1-celled ovary, 1 ovule, short style, and enlarged stigma. Several separate fruits on stalks 3/16 inch long are produced from a flower. The brown elliptic seed is more than ½ inch long. Collected in flower in May and July and in fruit from February to May and in November.

The wood is described as similar to that of the related species No. 322, haya prieta, lancewood, *Oxandra lanceolata* (Sw.) Baill., and to be used for the same purposes. However, in Puerto Rico the supply is limited and the size restricts use to posts.

PUBLIC FOREST.—Luquillo.

Uncommon in lower Luquillo forest at 500–2,000 feet altitude in Luquillo Mountains of Puerto Rico. Reported long ago from St. Croix.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, and Guadeloupe.

OTHER COMMON NAMES.—haya, haya mala (Puerto Rico); yaya, yaya boba, yaya blanca (Dominican Republic); purio (Cuba); lancewood (English, Jamaica); bois de l'an (Guadeloupe); bois de lance bâtard (Haiti).

323. Yaya, lancewood *Oxandra laurifolia* (Sw.) A. Rich.

Flowering twig (upper right), fruiting twig (below), natural size.

324. Anón cimarrón ***Rollinia mucosa*** **(Jacq.) Baill**

This rare tree with edible mucilaginous fruit is distinguished by: (1) the elliptic leaves 4–8 inches long and 1¼–2¾ inches wide, alternate in 2 rows on nearly horizontal twigs; (2) flowers 1–1¼ inches broad, yellow green, with 3 large thick, winged petals; and (3) rounded multiple fruit 2½–4 inches in diameter, whitish green, with many spreading, pointed conic tubercles ¼–½ inch long, whitish sweet and edible pulp, many-seeded.

A small evergreen tree to 45 feet high and 6 inches in trunk diameter. Bark gray, smooth, slightly warty. Twigs nearly horizontal, green and finely hairy when young, afterwards brown with light dots (lenticels), ending in bud of minute folded brown hairy leaves without scales or stipules.

The leaves are alternate in 2 rows and have petioles ⅜ inch long, yellow green, slightly hairy. Leaf blades are elliptic, thin, with long point at apex and short point at base. The upper surface is shiny green, almost hairless, turned up on both sides of midvein, with many curved sunken side veins, the lower surface dull light green with raised side veins and with minute inconspicuous hairs.

Flowers 3 or fewer opposite the base of a leaf on stalks ¾–1½ inches long, yellow green. The flower consists of calyx of 3 pointed sepals 3/16 inch long; corolla of 6 thickened finely hairy petals, the outer 3 pointed and ¼ inch long and 3 forming oblong thickened wings ½–⅝ inch broad; stamens many, crowded in ring, 1/32 inch long, light yellow; and many ligh yellow pistils crowded on conical base in centra mass ⅛ inch long and broad, each composed o narrow ovary and stigma.

The rounded multiple fruit is composed o many crowded individual fruits ending in stou spreading points, each with a brown ellipti seed ⅝ inch long in sticky whitish pulp. Flower ing in spring and summer and with fruits i summer.

The yellowish wood is reported to be hard heavy, and strong.

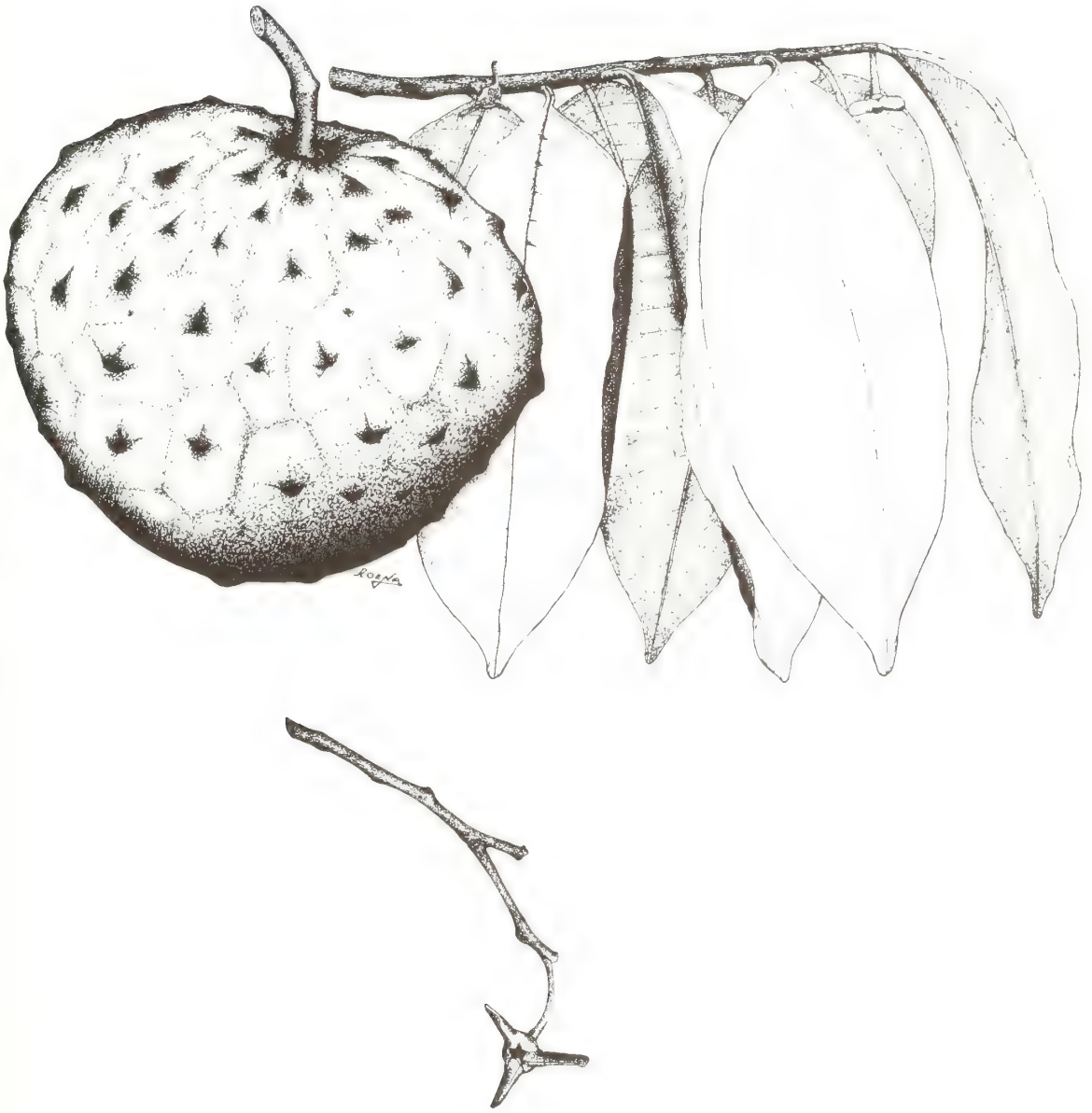
Planted in various tropical countries for th edible mucilaginous fruits, to which the specifi name refers.

Rare in moist limestone and upper Cordiller forests at 500–2,000 feet altitude in Puert Rico.

PUBLIC FORESTS.—Guajataca, Maricao.

RANGE.—Hispaniola, Puerto Rico, and fron Guadeloupe and Dominica to St. Vincent an Trinidad. Also northwestern South Americ from Colombia and Venezuela to Brazil, Peru and Ecuador. The native range uncertain an extended by cultivation.

OTHER COMMON NAMES.—cachimán (Puert Rico); candongo (Dominican Republic); mu lato (Colombia); riñón, riñón de monte (Vene zuela); chirimoya (Ecuador); anón (Peru) wild sugar-apple (Trinidad); cachiman mor veux (Guadeloupe); araticum, araticum pitay (Brazil).



324. Anón cimarrón *Rollinia mucosa* (Jacq.) Baill.

Flowering twig (above), fruit (left), flower (lower right), natural size.

LAUREL FAMILY (LAURACEAE)

Trees, mostly large, and few shrubs, known by: (1) bark, wood, and leaves aromatic; (2) leaves mostly alternate (sometimes opposite or whorled), simple, commonly elliptic, entire, pinnate-veined with few long curved side veins, often leathery, with minute gland dots, without stipules; (3) flowers mostly small, yellow, greenish, or whitish, usually many in lateral branched clusters (panicles), bisexual or sometimes male and female on different plants (dioecious), regular, often with short cup (hypanthium), 3 sepals and 3 similar petals (or 6 tepals), 9–12 stamens or some reduced to staminodes, the anthers opening by 2 or 4 pores with lids, and pistil with superior 1-celled ovary with 1 ovule, and short style; and (4) fruit a berry or drupe with 1 large seed, mostly with cup or tube from calyx or corolla persistent at base. Also vol. 1, p. 110.

Key to species

A. Leaves with 3 main veins from near base.
  B. Leaves alternate, dull green, thin; twigs finely hairy when young; native species of mountains—341. *Phoebe montana.*
  BB. Leaves mostly opposite, shiny green, mostly thickened; twigs hairless; introduced species.
    C. Twigs ending in enlarged buds covered by overlapping scales, with odor and taste of camphor—327. *Cinnamomum camphora.**
    CC. Twigs with buds not enlarged or covered by overlapping scales, with odor and taste of cinnamon.
      D. Leaves lanceolate, about 3 times as long as broad, less than 1⅜ inches wide—326. *Cinnamomum burmannii.**
      DD. Leaves elliptic, about twice as long as broad, mostly more than 2 inches wide—328. *Cinnamomum zeylanicum.**
AA. Leaves with 1 main vein bearing side veins (pinnate-veined).
  E. Leaves broadest beyond middle, rounded or blunt-pointed at apex.
    F. Leaves clustered at or near ends of twigs, 1½–3½ inches long—50. Nemocá, *Ocotea spathulata* Mez.
    FF. Leaves borne singly, 3–7 inches long.
      G. Leaves with lower surface densely hairy, reddish brown when young but becoming gray—46. Canelón, *Ocotea cuneata* (Griseb.) Urban.
      GG. Leaves shiny on both surfaces, hairless or nearly so, veins mostly reddish tinged near base—49. Nuez moscada, *Ocotea moschata* (Meisn.) Mez.
  EE. Leaves broadest below or near middle, mostly long-pointed.
    H. Leaves very narrow, lanceolate, more than 4 times as long as broad.
      I. Leaves large, 7–14 inches long, often 3 or more at node (whorled)—325. *Aniba bracteata.*
      II. Leaves small, mostly less than 4 inches long, borne singly.
        J. Leaves with side veins forming fine network, lower surface soft hairy—43. Canelilla, *Licaria salicifolia* (Sw.) Kosterm.
        JJ. Leaves with side veins inconspicuous and not forming network, lower surface densely covered with pressed rusty hairs—337. *Ocotea wrightii.*
    HH. Leaves broader, mostly elliptic to ovate, mostly 2–3 times as long as broad.
      K. Leaves thickened, shiny green on both surfaces, with prominent network of fine veins.
        L. Leaves very thick and stiff; fruit cup with double margin—329. *Licaria brittoniana.*
        LL. Leaves thick but flexible; fruit cup with simple margin.
          M. Leaves with side veins sunken; fruits oblong, ¾–1 inch long, whitish—333. *Nectandra patens.*
          MM. Leaves with side veins not sunken; fruits round or elliptic, ½–⅝ inch long, blackish or dark blue—45. Laurel avispillo, Jamaica nectandra, *Nectandra coriacea* (Sw.) Griseb.
      KK. Leaves slightly thickened, dull green or the upper surface slightly shiny, the small veins inconspicuous.
        N. Fruit without calyx or cup at base.
          O. Fruit pear-shaped or nearly round, yellow green, 4–5 inches long, edible (avocado)—51. Aguacate, avocado, *Persea americana* Mill.*
          OO. Fruit elliptic, black, 1–1½ inches long, inedible—42. Guajón, *Beilschmiedia pendula* (Sw.) Benth. & Hook. f.
        NN. Fruit with calyx or cup at base.
          P. Fruit with 6-lobed calyx at base.
            Q. Fruit round.
              R. Leaves whitish beneath—339. *Persea urbaniana.*
              RR. Leaves covered beneath with short pressed brown hairs—338. *Persea krugii.*
            QQ. Fruit elliptic, twice as long as broad—340. *Phoebe elongata.*

PP. Fruit with cup at base, not 6-lobed (lobes often persistent in No. 47).
- S. Fruit cup with double margin.
  - T. Fruit nearly round, about ⅝ inch long—47. Laurel espada, *Ocotea floribunda* (Sw.) Mez.
  - TT. Fruit elliptic, about twice as long as broad, ¾ inch or more in length.
    - U. Fruit green or dark blue, in half-round red cup; leaves abruptly long-pointed at apex—44. Palo de misanteco, Gulf licaria, *Licaria triandra* (Sw.) Kosterm.
    - UU. Fruit black, in saucer-shaped cup; leaves broadly short-pointed at apex—335. *Ocotea foeniculacea.*
- SS. Fruit cup with simple margin.
  - V. Fruits many, round, about 5/16 inch in diameter, the cup covered with warts; leaves often with scattered raised dots (galls)—48. Laurel geo, *Ocotea leucoxylon* (Sw.) Mez.
  - VV. Fruits mostly few, larger, with smooth cup; leaves without raised dots.
    - W. Fruit nearly round.
      - X. Fruit stalk much thickened below cup—332. *Nectandra membranacea.*
      - XX. Fruit stalk not thickened—330 *Nectandra antillana.*
    - WW. Fruit elliptic, about twice as long as broad.
      - Y. Leaves often with calluslike thickenings (galls) in vein angles beneath—336. *Ocotea portoricensis.*
      - YY. Leaves without calluslike thickenings in vein angles beneath.
        - Z. Twigs, branches of flower clusters, and flowers with loose rusty hairs—331. *Nectandra krugii.*
        - ZZ. Twigs, branches of flower clusters, and flowers hairless or with short pressed hairs—334. *Nectandra sintenisii.*

325. Canelillo ***Aniba bracteata*** **(Nees) Mez**

This rare tree of mountain forests of eastern Puerto Rico is identified by: (1) large lance-shaped to elliptic slightly thickened leaves commonly 3–4 at a node; (2) elliptic berry ¾ inch long, with warty irregularly toothed cup ⅜–½ inch long and broad at base.

Evergreen small to medium-sized tree 40 feet high and 6 inches in trunk diameter or larger, with horizontal branches. Twigs stout, rusty hairy when young.

Leaves commonly 3–4 at a node, sometimes 5–6 (whorled), also partly alternate, with short stout petioles ¼–½ inch long. Blades 6–16 inches long and 1½–4½ inches wide, the straight margins gradually narrowed to blunt or short-pointed base and long narrow apex, hairless, the upper surface green, and the lower surface light green with raised network of veins.

Flower clusters (panicles) 2–5 inches long, branched, at leaf bases. Flowers many, nearly stalkless, about 1/16 inch long and broad, composed of finely hairy calyx with 6 pointed lobes less than 1/16 inch long; 9 stamens and 3 smaller sterile stamens (staminodes); and pistil with 1-celled ovary. The fruit has a half-round cup and contains 1 large seed. With fruits in winter and spring.

Wood yellowish, hard, heavy, and fine-textured.

Rare in lower and upper Luquillo forests at 1,000–2,000 feet altitude and near Yabucoa in eastern Puerto Rico.

PUBLIC FOREST.—Luquillo.

RANGE.—Puerto Rico, Montserrat, Guadeloupe, Dominica, Martinique, St. Lucia, and St. Vincent.

OTHER COMMON NAMES.—bois jaune, laurier bois, laurier jaune (Guadeloupe, Martinique); laurier rouge (Dominica).

325. Canelillo *Aniba bracteata* (Nees) Mez

Twig with immature fruits (left), fruits (lower right), two-thirds natural size.

326. Malay cinnamon ***Cinnamomum burmannii*** **(Nees) Blume** *

Though not the main source of the spice, this species of cinnamon is sometimes grown in Puerto Rico as an ornamental. Distinguishing characters are: (1) bark and foliage with pleasant taste and odor of cinnamon; (2) mostly paired oblong to lanceolate slightly thickened leaves long-pointed at apex, with 3 main veins from near the short-pointed base; (3) many small yellowish flowers about ¼ inch wide, in branched clusters; and (4) many elliptic blue-black fruits about ½ inch long with shallow cup bordered by base of calyx lobes.

A small evergreen planted tree 25 feet or more in height and 8 inches in trunk diameter. Bark brown, smoothish, the inner bark brown and spicy. Twigs slender, finely hairy when young.

Leaves mostly opposite, with slender petioles of ¼–⅜ inch. Blades mostly 2½–4 inches long and ¾–1⅜ inches wide, sometimes larger, hairless or nearly so, the upper surface shiny green, and the lower surface dull whitish green.

Flower clusters (panicles) about 3 inches long and broad, at ends and sides of twigs. The flowers on slender stalks have finely hairy calyx with 6 lobes 3/16 inch long, 9 stamens mostly with glands toward base, and pistil with elliptic ovary, slender style, and enlarged stigma. The fleshy fruits (berries) have at base a shallow cup with 6 spreading broken calyx lobes. Collected with fruits in January.

Uncommon as an ornamental in Puerto Rico.

RANGE.—Native of southeastern Asia from India to China and Malaya. Planted beyond in tropical regions as an ornamental and source of cinnamon.

OTHER COMMON NAME.—canela de China (Cuba).

Trees of this species have been referred to cassia-bark-tree, *Cinnamomum cassia* (Nees) Nees & Eberm. That species also from southeastern Asia has larger, thicker leaves with the 3 veins raised beneath and the fruit with deep cup.

327. Alcanfor, camphor-tree ***Cinnamomum camphora*** **(L.) Sieb.***

A small evergreen tree to 25 feet high and 6 inches in trunk diameter, with gray rough furrowed bark and dense oval crown, easily recognized by its distinctive odor of camphor in crushed leaves and twigs. Other characters for identification are: (1) mostly opposite ovate to elliptic leaves 2–3 inches long and ¾–2 inches wide, sometimes larger, long-pointed at apex and blunt to rounded at base, slightly thickened, hairless, with 3 main veins from near base, shiny green above and dull whitish green beneath, pinkish when young, with slender mostly long petioles of ⅜–1¼ inches; (2) greenish hairless twigs ending in enlarged elliptic brownish buds ¼–⅜ inch long, covered by many rounded overlapping scales; (3) small yellowish flowers ⅛ inch broad in lateral branched clusters (panicles) of 2–3 inches; and (4) the round black berries ⅜ inch in diameter with short cuplike base, 1-seeded. Not observed to bear flowers and fruits locally. The wood is yellowish, fine-textured, takes a good polish, and has served elsewhere in cabinetwork, especially chests because the odor is repellent to insects. Camphor gum and oil, used in medicine and industry, are prepared by steam distillation of leaf clippings and wood from plantations. Uncommon as an ornamental in moist parts of Puerto Rico and in St. Croix. Grown from seeds and cuttings. Widely planted for ornament, also windbreaks and hedges, in subtropical and warm temperate regions north to southern continental United States from Florida to Texas and California.

RANGE.—Native of China, Japan, and Taiwan and widely introduced through tropical and subtropical regions.

OTHER COMMON NAMES.—alcanfor, alcanfor del Japón (Spanish); camphor-tree, Japanese camphor-tree (English); camphier (French); canforeiro (Brazil).

BOTANICAL SYNONYM.—*Camphora camphora* (L.) Karst.

326. Malay cinnamon *Cinnamomum burmannii* (Nees) Blume*

Fruiting twig, natural size.

328. Canela legítima, cinnamon-tree ***Cinnamomum zeylanicum* Breyne** *

Canela legítima or cinnamon-tree, sometimes cultivated for ornament and shade, is the source of the spice of the same name. This aromatic tree is recognized by: (1) the aromatic, spicy bark, the cinnamon of commerce; (2) the paired, very shiny green ovate or elliptic leaves also aromatic, stiff and slightly thickened, with 3 or 5 long main veins from the base; (3) many small yellow-white flowers less than ¼ inch wide, in branching clusters at and near twig ends; and (4) the elliptic blackish berry fruits ½–⅝ inch long, with 6-lobed cuplike base.

A small evergreen planted tree to 20 feet high and 6 inches in trunk diameter, with widely spreading dense crown. The bark is brown, smoothish with warts (lenticels), becoming slightly fissured. Inner bark is light brown, turning reddish brown on exposure, with spicy odor and strong taste of cinnamon. The slender twigs are light green and hairless, with same taste.

The leaves are opposite, or paired, or nearly so, hairless. The yellow-green petioles are ½–1 inch long, flattened above, with spicy taste. Blades are 3–6 inches long 1½–3¾ inches wide, blunt or short-pointed at apex, the rounded base abruptly narrowed into the widened petiole, not toothed on edges. The upper surface is shiny green, yellow green when young, with 3 or 5 yellowish raised main veins, curved up on both sides, and the lower surface dull whitish green.

Flower clusters (panicles) 2–3½ inches long bear many flowers with distinctive odor, on forking yellow-white stalks. There are 6 spreading calyx lobes less than ⅛ inch long, yellow white and finely hairy; 9 stamens; and pistil with 1-celled ovary, slender style, and enlarged stigma. The fleshy fruits have 6-lobed cuplike calyx at base and contain 1 large seed. With flowers and fruits from late spring to fall.

The reddish brown bark is the source of the cinnamon or Ceylon cinnamon of commerce and has served in medicine.

The sapwood is light brown and slightly soft.

Rarely planted for ornament and shade in Puerto Rico and the Virgin Islands. Elsewhere through the tropics the trees are grown also for the spice and locally naturalized.

RANGE.—Native of southern Asia from India and Malaya.

OTHER COMMON NAMES.—canela (Puerto Rico, Spanish); canela de Ceilán (Spanish); cinnamon (English); Indian cinnamon-tree (Jamaica); cannelle, cannellier (French); canela, canela da India (Brazil).

328. Canela legítima, cinnamon-tree *Cinnamomum zeylanicum* Nees*

Two-thirds natural size.

329. Canelón ***Licaria brittoniana* Allen & Gregory**

This distinct species of the laurel family is known only from western Puerto Rico, where it is rare or locally common. It is recognized by: (1) erect branching with several trunks and columnar crown; (2) leaves elliptic, 2½–6 inches long and 1¼–3 inches wide, thick, stiff and leathery, both surfaces slightly shiny and with prominent network of minute veins; (3) yellow-green flowers ¼ inch long and ⅛ inch broad, in clusters at leaf bases; and (4) fruit an oblong, pointed violet berry ½–⅝ inch long, half covered by a deep brown cup with double 6-lobed border.

Evergreen medium-sized tree to 60 feet high and 1½ feet in trunk diameter, commonly 30 feet and 6 inches, often with several trunks. Bark gray to pinkish, smoothish with warts (lenticels), becoming slightly rough, coming off in flat scales. Inner bark is brown, with spicy aromatic taste. Twigs gray, brown when young, smoothish with raised dots (lenticels), hairless.

The alternate hairless leaves have stout petioles ¼–½ inch long. The blades are short-pointed at both ends, dark green on upper surface and yellow green on lower surface.

Flower clusters (panicles) at leaf bases are 1–2 inches long, brownish. Flowers several to many, stalkless or nearly so, composed of urn-shaped fleshy 6-lobed finely hairy calyx, the 3 outer lobes pointed and 3 smaller rounded inner lobes, 3 stamens united into a tube, 6 sterile stamens (staminodes), and pistil with elliptic ovary and short slender style. Collected with flowers in summer and fall and with fruits from summer to winter.

The wood has been used locally for stakes and in general construction. However, the trees with several trunks seldom reach saw-timber size.

Rare or locally common in moist limestone forest from Vega Baja west and lower and upper Cordillera forests, especially on serpentine, at 500–3,000 feet altitude in western Puerto Rico.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Known from western and northern Puerto Rico.

OTHER COMMON NAMES.—canela, canela amarilla, Casa María laurel, cacao macho (Puerto Rico).

This species was discovered in 1932 by Nathaniel Lord Britton (1859–1934) on the grounds of the Interamerican University near Casa María at San German, altitude about 400 feet. However, his manuscript name was never effectively published. The next specimens were obtained in 1939 by Luis E. Gregory, while making a large collection of tree specimens with the United States Forest Service. The scientific name dating from 1951 appropriately honors the director-in-chief of the New York Botanical Garden and coauthor of "Botany of Porto Rico and the Virgin Islands." (*10*)

Apparently there are no closely related trees in Puerto Rico and nearby islands. In foliage this species resembles *Licaria puchury-major* (Mart.) Kosterm., known as puchury, a small tree of Amazonian Brazil and Venezuela. The latter has larger, more numerous flowers and much larger fruits and has been planted for medicinal purposes.

329. Canelón

Licaria brittoniana Allen & Gregory

Fruits (upper right) and flowering twig, natural size.

330. Aguacatillo ***Nectandra antillana*** **Meisn.**

This uncommon laurel in eastern and central Puerto Rico is identified by: (1) leaves oblong to broadly lance-shaped, 2½–9 inches long and ¾–3 inches wide, long-pointed at apex, with few side veins, hairless or nearly so; (2) flowers whitish, ⅜ inch across the 6 spreading calyx lobes, many in wide forking clusters; and (3) round berries almost ⅜ inch in diameter, blue black, on a red saucer-shaped shallow cup.

Evergreen medium-sized to large tree to 65 feet high and 1½ feet or more in trunk diameter. Bark gray, becoming scaly. Twigs slender, slightly angled, finely hairy when young.

Leaves alternate, with petioles ¼–⅝ inch long, slightly hairy. Blades slightly thickened, mostly short-pointed at base, with 5–7 curved veins on each side of midvein, the upper surface dull green, and the lower surface paler with prominent veins and hairy on midvein.

Flower clusters (panicles) at leaf bases, 2–5 inches long, widely branching. Many fragrant short-stalked flowers consisting of finely hairy whitish calyx with 6 spreading lobes 3/16 inch long, 9 stalkless stamens, and pistil with rounded ovary and short style. The fruits have slightly enlarged reddish stalks and contain 1 round seed nearly ¼ inch in diameter. Flowering and fruiting in spring and summer.

The light brown wood serves for posts and may be cut for lumber but not distinguished from related species of laurel. Elsewhere used for shingles, staves, and lumber but reported not durable where exposed.

Uncommon in moist coastal, lower Luquillo and lower Cordillera forests from sea level to 1,500 feet altitude in central and western Puerto Rico. Also in St. Thomas.

PUBLIC FORESTS.—Guilarte, Luquillo, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and St. Thomas, Guadeloupe, Martinique, and Tobago.

OTHER COMMON NAMES.—laurel bobo, geo rojo (Puerto Rico); laurel blanco, laurel cambrón (Dominican Republic); aguacatillo (Cuba); shingle-wood, white-wood, long-leaved sweetwood, yellow sweetwood (Jamaica) laurier caca (Grenada); laurier grandes feuilles (Haiti); bois dous avocat (Guadeloupe) laurier gland (Martinique).

330. Aguacatillo *Nectandra antillana* Meisn.

Flowers (above), fruiting twig (below), natural size.

331. Laurel canelón ***Nectandra krugii*** **Me**

An uncommon laurel in mountain forests of Puerto Rico, identified by: (1) twigs, young leaves, petioles, branches of flower clusters, and flowers with short rusty or light brown hairs; (2) oblong to broadly lance-shaped leaves, 4½–11 inches long and 1¼–4 inches wide, the side veins sunken; (3) white flowers ⅜ inch across the 6 calyx lobes, several to many on a long-stalked lateral cluster; and (4) narrowly elliptic berry, ⅝–⅞ inch long and about ⅜ inch wide, dark violet, with half round cup.

Evergreen medium-sized tree to 70 feet high and 14 inches in trunk diameter. Bark gray, smooth.

Leaves alternate, with petioles ⅜–⅞ inch long. Blades long-pointed at apex, short-pointed or blunt at base, not toothed on edges, thin, the upper surface shiny green with sunken veins and finely hairy when young, the lower surface dull light green and finely hairy, especially on the raised veins.

Flower clusters (panicles) at leaf bases, 3–5 inches long, branched. The slightly fragran flowers on stalks of ⅛–⅜ inch have whit calyx with 6 elliptic finely hairy lobes 3/16 inc long, 9 stamens, and pistil with rounded ovar and short style. Fruits with cups about ⅜ inc long and broad. Flowering in fall and matur ing fruits in winter and spring.

The wood has served for posts.

Uncommon in upper Cordillera forest a 1,000–2,000 feet altitude in central Puerto Ric also Sierra de Cayey.

PUBLIC FORESTS.—Carite, Toro Negro.

RANGE.—Hispaniola (Dominican Republic) Puerto Rico, Guadeloupe, and Dominica.

OTHER COMMON NAME.—laurel (Puert Rico).

The scientific name honors Leopold Kru (1833–98), German consul in Puerto Ric businessman, botanist, and patron of scienc who aided P. Sintenis, collector of the typ specimen in 1885.

31. Laurel canelón *Nectandra krugii* Mez

Flowering twig (above), fruiting twig (lower right), two-thirds natural size.

332. Laurel prieto *Nectandra membranacea* (Sw.) Grisel

This member of the laurel family is distinguished by: (1) lance-shaped or narrowly elliptic leaves, long-pointed at apex and abruptly long-pointed at base with edges rolled under and with the few lateral veins long curved and prominent beneath; (2) numerous minute 6-parted white flowers $\frac{1}{8}$–$\frac{3}{16}$ inch across in branched clusters at base of leaves; and (3) the black fleshy fruit (drupe) about $\frac{1}{2}$ inch long, rounded to elliptic, with saucer-shaped cup at base.

Small to large evergreen tree to 80 feet high and 16 inches in trunk diameter. Twigs, bark, and leaves have the spicy taste characteristic of the family. The bark is gray or brown and smooth, inner bark light brown. The slender green twigs and leafstalks are minutely brown hairy when young.

Leaves are alternate, the leafstalk $\frac{1}{4}$–$\frac{1}{2}$ inch long and merging into base of blade. Blades are 3–9 inches long and 1–$2\frac{1}{2}$ inches broad, thin, hairless or nearly so, above green to dark green and slightly shiny with lateral veins a little sunken, and beneath shiny lighter green with lateral veins prominent.

Flower clusters (panicles) 2–6 inches long, lateral at base of leaves, with branches often finely hairy bear numerous minute white 6-parted flowers. The calyx has 6 spreading white lobes less than $\frac{1}{16}$ inch long, finely hairy on outside; 9 minute white stamens; and whitish pistil less than $\frac{1}{8}$ inch long, with 1-celled ovary, style, and stigma. The black fleshy fruit (drupe) is 1-seeded and has a saucer-shaped cup $\frac{1}{4}$ inch across at base and a thickened stalk. Recorded in flower nearly through the year an in fruit in winter and spring.

The sapwood is gray and the heartwood ye lowish brown to golden brown. The wood moderately soft and lightweight (specific gra ity 0.45) and moderately strong. It has straigl to occasionally wavy grain, medium textur and medium luster. Air-seasoning is at a mo erate rate and satisfactory. The wood saws ar machines easily but tends to tear and develc fuzziness during sawing and torn grain in tur ing. The heartwood is very susceptible to dr wood termites and other insects.

Laurel prieto is used for posts and is suitab for boxes, crates, interior trim, general ca pentry, and light construction. However, lacks attractiveness and good working prope ties for use in furniture and cabinetwork.

Uncommon in lower Cordillera, lower L quillo, and moist limestone forests at 600–2,0 feet altitude in foothills and mountains Puerto Rico. Also recorded long ago from S Thomas and St. Croix.

PUBLIC FORESTS.—Carite, Guajataca, L quillo, Río Abajo, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, Puer Rico, St. Thomas and St. Croix (?), near throughout Lesser Antilles to Grenada a Barbados, and Tobago and Trinidad. Also Central America from British Honduras Costa Rica and in Venezuela.

OTHER COMMON NAMES.—laurelillo, laur laurel geogeo (Puerto Rico); laurel, laur blanco (Guatemala); laurier noir (Dominica sweetwood (Barbados); bois violon (Guad loupe).

32. Laurel prieto *Nectandra membranacea* (Sw.) Griseb.

Flowering twig (left), fruits (lower right), natural size.

333. Laurel geo colorado *Nectandra patens* (Sw.) Grisel

This common species of laurel flowers as a shrub, often vinelike. It is characterized by: (1) leaves elliptic, 3–8 inches long and 1¼–3 inches wide, slightly thickened and leathery, shiny green, with prominent network of veins on both surfaces and tufts of hairs in vein angles beneath; (2) small whitish flowers 3/16 inch across the 6 spreading calyx lobes, many in branched clusters at leaf bases; and (3) oblong berries ¾–⅞ inch long, with shallow red cup at base.

Evergreen shrub, often vinelike, or small tree 6–25 feet high and to 6 inches in trunk diameter, sometimes a medium-sized tree to 60 feet high and 1 foot in diameter. The bark is smooth, gray or brown, the inner bark whitish with spicy taste. Twigs are slender, brown, finely hairy when young.

The petioles of the alternate leaves are ⅛–⅜ inch long, finely hairy. Blades are short- to long-pointed at apex, short-pointed at base, the upper surface shiny green, hairless, with 6–8 pairs of curved, slightly sunken side veins and raised network of small veins, the lower surface yellow green with raised veins and hairless except for tufts in vein angles.

The branched flower clusters (panicles) at leaf bases are 1½–3 inches long. Flowers man short-stalked, composed of finely hairy whitis calyx with 6 spreading lobes 1/16 inch long, tiny stamens with hairy stalks, and pistil wit elliptic ovary and short style. The fruits wit slightly enlarged reddish stalks are reported t be blackish or whitish at maturity. There is oblong seed about ¾ inch long. Flowering i spring and fall and fruiting in summer an winter.

The wood is light brown and hard, used fc posts.

Common and widely distributed in moi forests of Puerto Rico, including moist coasta moist limestone, lower Luquillo, and lowe Cordillera forests from sea level to 2,000 fe altitude.

PUBLIC FORESTS.—Cambalache, Carite, Gu jataca, Guilarte, Luquillo, Maricao, Río Abaj Toro Negro, Vega.

RANGE.—Cuba, Jamaica, Hispaniola, Puer Rico, and Martinique.

OTHER COMMON NAMES.—laurel roset laurel (Puerto Rico); cap-berry, sweetwoc (Jamaica).

The specific name, meaning spreading, d scribes the shrubby or vinelike growth habi

333. Laurel geo colorado

Nectandra patens (Sw.) Griseb.

Two-thirds natural size.

334. Laurel amarillo ***Nectandra sintenisii* Mez**

An uncommon laurel in moist forests of Puerto Rico, characterized by: (1) young twigs and branches of flower clusters with short pressed or flat hairs; (2) lance-shaped to elliptic leaves 2–8 inches long and ¾–3 inches wide, long-pointed at apex, hairless, with few side veins; (3) white flowers 5/16–⅜ inch across the 6 calyx lobes, many in long-stalked widely forking cluster; and (4) elliptic berry ½ inch long, with warty half-round cup.

Evergreen medium-sized tree to 60 feet high and 14 inches in trunk diameter. Bark smooth, grayish. The slender twigs are slightly angled and covered with short pressed hairs when young.

Leaves alternate, with petioles ¼–½ inch long. Blades are slightly thickened, short-pointed at base, with 5–6 curved veins on each side of midvein, slightly shiny green above and paler beneath.

Flower clusters (panicles) at leaf bases and ends of twigs are 2½–6 inches long and wide, with long slender widely forking branches, hairless. Flowers many on short stalks ⅛–¼ inch long, composed of finely hairy white calyx with 6 spreading lobes ⅛ inch long, 9 stalkless stamens, and pistil with rounded ovary and slender style. The fruits have enlarged reddish stalks and contain 1 oblong seed. Flowering from spring to fall and fruiting in summer and winter.

The pale greenish-yellow heartwood merges gradually into the slightly lighter colored sapwood. The wood is moderately soft, lightweight (specific gravity 0.55), has satiny luster, medium texture, and interlocked or straight grain. It is very susceptible to attack by dry-wood termites but may be moderately durable in the ground. Rate of air-seasoning is moderate, without excessive degrade. The easily worked wood produces good surfaces in all operations except planing, requiring considerable sanding of exposed surfaces.

Wood of laurel amarillo is used for posts or poles and is suitable for general construction, boxes, crates, carpentry, millwork, flooring, and interior trim. It should serve also for some kinds of furniture and cabinetwork. Similar species are utilized also for tool handles, instruments, crossties, and boat construction.

Uncommon in lower Cordillera, lower Luquillo, and moist limestone forests at 500–1,800 feet altitude in Puerto Rico, mainly foothills. Also recorded long ago from St. Thomas.

PUBLIC FORESTS.—Carite, Guajataca, Luquillo, Río Abajo, Toro Negro.

RANGE.—Puerto Rico.

OTHER COMMON NAMES.—laurel blanco, laurel geo, laurel macho, laurel (Puerto Rico).

The scientific name honors Paul Ernst Emil Sintenis (1847–1907), German botanical collector, who discovered this tree in 1885.

334. Laurel amarillo *Nectandra sintenisii* Mez

Fruiting twig (above), flowers (lower right), natural size.

335. Palo santo ***Ocotea foeniculacea* Mez**

A rare species found in Puerto Rico only in central and western mountains and distinguished by: (1) leaves stiff and leathery, elliptic, 2–3¼ inches long and 1–1½ inches wide, short-pointed at both ends, hairless, shiny, with prominent network of veins beneath; and (2) elliptic berry ¾ inch long and ½ inch wide, black in saucer-shaped cup double-margined.

Small evergreen tree 30 feet high and 4 inches in trunk diameter, reported to reach 80 feet in height. Bark described as very aromatic and spicy as in fennel (*Foeniculum,* source of the specific name). Twigs slender, with long and short internodes, hairy when young.

Leaves alternate but clustered near ends of twigs. Petioles stout, ⅛–¼ inch long. Blades hairless on upper surface, the lower surface with prominent network and minute hairs on veins.

Flower clusters (like racemes) shorter than the leaves, hairy. Flowers composed of white hairy calyx with 6 pointed lobes, 9 stamens with short hairy filaments, and pistil with rounded hairless ovary and short style. Collected in flower from spring to fall and with fruits in May and June.

Rare and local in upper Cordillera forest at 2,500–3,500 feet altitude in high mountains of central and western Puerto Rico.

PUBLIC FORESTS.—Maricao, Toro Negro.

RANGE.—Puerto Rico, Hispaniola, and Cuba.

OTHER COMMON NAMES.—laurel (Puerto Rico); canelilla (Dominican Republic).

335. Palo santo *Ocotea foeniculacea* Mez

Fruiting twig (above), flowering twig (lower right), natural size.

336. Laurel de paloma ***Ocotea portoricensis* Mez**

This uncommon tree found only in upper mountain forests of Puerto Rico is identified by: (1) lance-shaped or elliptic leaves 2–4½ inches long and ⅝–1⅜ inches wide, long-pointed at both ends, slightly thickened, with calluslike thickenings in vein angles beneath; and (2) cylindric berries ⅝ inch long and ¼ inch in diameter, on a short narrow reddish brown cup.

Evergreen tree to 50 feet high and 10 inches in trunk diameter. Twigs and petioles finely hairy when young.

Leaves alternate, with petioles ¼–⅜ inch long. Blades slightly shiny, becoming nearly hairless.

Flower clusters (panicles) 2–4 inches long at leaf bases, much branched. Flowers many on slender stalks of ⅛ inch, male and female on different trees (dioecious), more than ⅛ inch across the calyx of 6 spreading finely hairy lobes. Male flowers have 9 stamens and nonfunctional pistil with hairless ovary, slender style, and enlarged stigma. The berries on a stout stalk have a short funnel-shaped cup more than ⅛ inch long and are 1-seeded. With flowers from spring to fall and with fruits in summer and winter.

Uncommon in upper Cordillera and upper Luquillo forests at 1,000–3,000 feet altitude through high mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rico. Reported long ago from Cuba.

OTHER COMMON NAMES.—laurel, laurel avispillo, laurel geo (Puerto Rico).

336. Laurel de paloma *Ocotea portoricensis* Mez

Twig with female flowers (above), fruiting twig (lower left), twig with male flowers (lower right), natural size.

337. Laurel canelón ***Ocotea wrightii* (Meisn.) Mez**

A rare species of the western mountains of Puerto Rico, characterized by: (1) lance-shaped leaves 2½–5 inches long and ⅝–1⅛ inches wide, long-pointed at both ends, thick and leathery, the lower surface with a dense covering of rusty or grayish pressed hairs; and (2) oblong berries, ¾–1 inch long, in a large funnel-shaped thick cup nearly ¾ inch long and ½ inch wide, with double margin or ring.

Evergreen tree to 60 feet high and 16 inches in trunk diameter. Bark aromatic. Young twigs and petioles are covered with small pressed hairs.

The alternate leaves have narrowly winged petioles about ¼ inch long. Blades are stiff, slightly shiny and hairless on upper surface, and turned under at edges.

Flower clusters (panicles) shorter than the leaves, with hairy branches. Flowers about ⅛ inch long have densely hairy calyx with 6 lobes, 9 stamens, and pistil with hairless 1-celled ovary and long style. The seed is oblong. Noted with flowers in summer and fall and with fruits in winter and spring.

Rare to uncommon in upper Cordillera forest at 1,500–3,000 feet altitude in mountains of western Puerto Rico. A variation or closely related species with shiny hairless leaves was found in La Torrecilla.

The very aromatic bark serves for tea in folk medicine elsewhere.

PUBLIC FORESTS.—Guilarte, Maricao.

RANGE.—Puerto Rico, Hispaniola, and Cuba.

OTHER COMMON NAMES.—canelón, canela (Puerto Rico); canelilla (Dominican Republic); canelle (Haiti).

Charles Wright (1811–1885), botanical collector from the United States, discovered this species in Cuba. He made important plant collections in Cuba and the Dominican Republic, as well as in the Southwest along the Mexican border.

337. Laurel canelón *Ocotea wrightii* (Meisn.) Mez

Fruiting twig (above), flowering twig (lower right), natural size.

338. Canela ***Persea krugii*** **Me**

The soft coat of silky brown pressed hairs on lower leaf surfaces, young twigs, branches of flower clusters, and flowers distinguish this rare tree of mountain forests of western Puerto Rico from other native members of the family. Other characters are: (1) lance-shaped to narrowly elliptic leaves 1½–4 inches long and ½–1¼ inches wide; and (2) round berries ⅜ inch in diameter, with 6-lobed calyx and enlarged stalk at base.

Evergreen small to medium-sized tree 45 feet high and 1 foot in trunk diameter. Bark gray, smoothish, becoming rough. Inner bark is brownish, with slightly spicy taste. Twigs brown, finely hairy.

The alternate leaves have hairy petioles ¼–½ inch long. Blades are long- or short-pointed at apex, short-pointed or blunt at base, not toothed, slightly thick and leathery, the upper surface becoming nearly hairless, with side veins inconspicuous.

Flower clusters (panicles) at leaf bases, 2–4 inches long, branched. Flowers many on stalks less than ⅛ inch long, about 3/16 inch across, cup-shaped, yellow; the hairy calyx compose of 3 outer lobes slightly shorter than the 3 inne lobes ⅛ inch long; 9 stamens and 3 smalle pointed nonfunctional stamens, and pistil wit hairless 1-celled ovary and slender style. Th fruits have thin greenish flesh and 1 larg round seed. With flowers from spring to fa and with fruits in winter.

The sapwood is whitish and moderately soft

Rare to uncommon in upper Cordillera fores at 1,500–2,500 feet altitude in high mountain of central and western Puerto Rico, also dwar forest above 4,000 feet altitude on Cerro d Punta. Recorded from near Coámo and Ad juntas west to Maricao and Aguadilla.

PUBLIC FOREST.—Maricao.

RANGE.—Puerto Rico and Hispaniola.

OTHER COMMON NAMES.—canela de la tierra almendro, macao, aquacillo (Dominican Re public); pêche marron (Haiti).

The scientific name commemorates Leopol Krug (1833–98), German businessman, bot anist, and patron of science, who lived in Puert Rico and studied West Indian plants.

38. Canela *Persea krugii* Mez

Fruiting twig (above), flowering twig (lower left), natural size.

339. Aguacatillo ***Persea urbaniana*** **Me**

As indicated by its common name, aguacatillo is a relative of the cultivated aguacate or avocado (No. 51). Identified by: (1) leaves slightly thick and leathery with edges turned under, elliptic, mostly 2–6 inches long and 1–3 inches wide, long- to short-pointed at both ends, the lower surface pale whitish green with minute short pressed hairs and often whitish; and (2) the rounded berries ⅜–⅝ inch in diameter, with 6-lobed calyx at base.

Small to medium-sized evergreen tree becoming 35–70 feet high and 8–12 inches in trunk diameter, with low buttresses to 1 foot high. Observed with fruits when only 8 feet high. Bark gray, smooth, with raised dots (lenticels). Inner bark light brown to orange, bitter. Twigs light green, becoming darker, with fine pressed hairs when young.

Leaves alternate, hairless or nearly so, with slender petioles ⅜–1 inch long. Upper surface dark green, slightly shiny, the midvein and side veins slightly sunken.

Flower clusters (panicles) at leaf bases, 1–4 inches long, branched. Flowers few, almost stalkless, yellowish, about ⅛ inch long and broad; the cup-shaped finely hairy calyx composed of 3 short outer lobes and 3 rounded inner lobes ⅛ inch long; 9 stamens and 3 smaller nonfunctional stamens; and pistil wit hairy 1-celled ovary and slender style. The slightly enlarged calyx lobes remain at base o fruit. With flowers and fruits through much o the year.

Uncommon in lower Luquillo and upper Cor dillera forests at 1,500–4,000 feet in mountain of Puerto Rico. Dwarf forest on the highes peak, Cerro de Punta, altitude more than 4,00 feet.

PUBLIC FORESTS.—Luquillo, Maricao, Tor Negro.

RANGE.—Jamaica, Puerto Rico, and Lesse Antilles in Montserrat, Guadeloupe, Dominica Martinique, and St. Lucia.

OTHER COMMON NAME.—sweetwood (Mont serrat).

BOTANICAL SYNONYM.—*Persea portoricensi* Britton & Wilson.

The name *Persea portoricensis* was given t shrubby plants from Cerro de Punta. Howeve that species has been united with *P. urbanian* of Jamaica and the Lesser Antilles. This spe cies was dedicated to Ignatz Urban (1848 1931), director of the botanical garden at Ber lin and author of floras of Puerto Rico an other West Indian islands.

339. Aguacatillo *Persea urbaniana* Mez

Fruiting twig (left), flowering twig (upper right), two-thirds natural size.

340. Laurel avispillo ***Phoebe elongata*** **(Vahl) Nees**

This tree of moist forests is identified by: (1) large buttresses at base of trunk; (2) narrowly elliptic shiny leaves 2–7 inches long and 1–3 inches wide, hairless or nearly so, long-pointed at apex and short-pointed or rounded at base; and (3) elliptic shiny black berries about 5/8 inch long with 6 pointed calyx lobes remaining at base on enlarged red cup and stalk.

Small to large evergreen tree becoming 100 feet or more in height and 16 inches in trunk diameter, with marked buttresses at base. The bark is smooth and gray. Twigs slender, drooping, often finely hairy when young.

The alternate leaves have slender petioles 3/8–5/8 inch long. Blades are slightly thickened, with few curved side veins, shiny green or dark green on upper surface, the lower surface paler and often hairy on veins.

Flower clusters (panicles) are 3–9 inches or more in length, with many slender branches, hairy or hairless. Flowers many on stalks of 1/8 inch or less, about 3/16 inch wide. Calyx composed of 6 greenish white lobes less than 1/8 inch long; stamens 9, with 3 smaller pointed sterile stamens (staminodes); and pistil with rounded 1-celled ovary and slender style. The berries are green when immature, 1-seeded. Flowering and fruiting irregularly over the year.

The common name laurel avispillo is applied also to another species (*Nectandra coriacea* (Sw.) Griseb.), and woods of the two have been confused. This species has pinkish-colored heartwood, which merges gradually into light brown sapwood. There are attractive slightly darker colored bands or stripes which develop fuzziness in machining operations. The wood is moderately soft and lightweight (specific gravity 0.47) and moderately strong. It has straight to irregular and tightly interlocked grain, medium texture, and medium to high luster. Air-seasoning at a moderate rate is easy and is satisfactory except for a moderate amount of warping. The wood is easily machined but requires extra care in turning and sanding. It is very susceptible to dry-wood termites and other insects, while logs are attacked by pinhole borers. Like that of related species, the heartwood may be moderately durable in the ground.

The wood is suitable for furniture, cabinetwork, interior trim, paneling, toys, novelties, and turning. It should serve also for carpentry, interior and exterior construction, and possibly for decorative veneer and plywood. Miscellaneous uses would be boxes, crates, toys, and boatbuilding.

Uncommon in moist limestone, lower Cordillera, and lower Luquillo forests at 100–800 feet altitude in northern foothills of Puerto Rico. Also St. Thomas and St. Croix.

PUBLIC FORESTS.—Guajataca, Luquillo, Río Abajo, Vega.

RANGE.—Cuba, Hispaniola, Puerto Rico, and from Montserrat to Trinidad.

OTHER COMMON NAMES.—laurel bobo, avispillo (Puerto Rico); boniatillo (Cuba); laurier canelle (Guadeloupe); laurier de rose (Dominica).

BOTANICAL SYNONYM.—*Cinnamomum elongatum* (Vahl) Kosterm.

340. Laurel avispillo *Phoebe elongata* (Vahl) Nees

Flowering twig (left), fruits (upper right), leaf (lower right), two-thirds natural size.

341. Avispillo ***Phoebe montana*** **(Sw.) Griseb.**

The leaves with 3 main veins, 2 prominent long curved side veins joining the midvein about ¼ inch above the base distinguish this rare member of the laurel family from all other native species. Other characteristics for recognition are: (1) leaves relatively small, 2–4 inches long and ¾–1½ inches wide, paler beneath; (2) minute greenish white, finely hairy flowers less than ⅛ inch long; and (3) elliptic blackish berries about ⅜ inch long with 6 pointed calyx lobes remaining at base, on an enlarged reddish stalk.

Medium-sized evergreen tree to 65 feet high and 1 foot in trunk diameter. Young twigs finely hairy.

The petioles of the alternate leaves are slender, about ¼ inch long, finely hairy. Blades are short-pointed at base, not toothed, long-pointed at apex, thin, the upper surface dull green, hairless or nearly so, with veins slightly sunken, and the lower surface paler and slightly hairy on veins.

Flower clusters (panicles) at leaf bases are 1–2 inches long, bearing many flowers less than ⅛ inch long on stalks of about 1/16 inch from the hairy branches. The calyx has 6 greenish white finely hairy lobes more than 1/16 inch long; there are 9 stamens and 3 smaller pointed sterile stamens (staminodes); and pistil with 1-celled ovary and short style. The fleshy fruits green when immature have 1 large seed. With flowers in spring and summer and with fruits from spring to fall.

Rare in lower Luquillo and moist limestone forests at 500–1,500 feet altitude in Puerto Rico.

PUBLIC FORESTS.—Luquillo, Río Abajo.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—laurel (Puerto Rico); laurel, sigua boba, sigua laurel (Dominican Republic); boniato del Pinar, sigua macho (Cuba); laurier rose (Haiti).

BOTANICAL SYNONYM.—*Cinnamomum montanum* (Sw.) Berchthold & Presl.

HERNANDIA FAMILY (HERNANDIACEAE)

Trees, shrubs, and woody vines, known by: (1) leaves alternate, mostly simple, large, entire or palmately lobed, palmate-veined, without stipules; (2) many small greenish flowers in branched clusters (cymes), bisexual or male and female on the same tree (monoecious), regular, with 3–8 sepals, no corolla, 3–5 stamens, often staminodes or glands, and pistil with inferior 1-celled ovary and 1 ovule, style, and broad stigma; and (3) fruit an akene enclosed by inflated base (receptacle) or with 2 long wings. Vol. 1, p. 130.

One species: 52. Mago, *Hernandia sonora* L.

341. Avispillo *Phoebe montana* (Sw.) Griseb.

Flowering twig (above), fruiting twig (lower right), two-thirds natural size.

POPPY FAMILY (PAPAVERACEAE)

Herbs, rarely shrubs and small trees (*Bocconia*), known by: (1) milky or colored sap (orange in *Bocconia*); (2) alternate simple leaves, entire to deeply lobed, with stipules; (3) flowers mostly solitary and showy (many in panicles in *Bocconia*), bisexual, with 2–3 sepals that fall early, 4–6 (12) petals (none in *Bocconia*), many stamens, and pistil with superior 1-celled ovary, 2 to many parietal placentas and stigmas and many ovules (1 in *Bocconia*); and (4) fruit a capsule.

342. Pan cimarrón — *Bocconia frutescens* L.

A treelike shrub of the poppy family, easily recognized by: (1) orange bitter sap in stems and leaves; (2) large elliptic leaves deeply lobed and toothed along edges, blue green and densely fine hairy beneath; (3) many small greenish flowers 3/8 inch long in large branching clusters; and (4) fruit an elliptic light gray capsule 3/8 inch long, splitting into 2 parts.

Evergreen shrub usually less than 10 feet high, rarely reaching the minimum size of a tree, 15 feet high and 3 inches in trunk diameter, with few spreading branches and without a definite crown. The bark is light brown, smoothish to slightly fissured, with enlargements at leaf scars, thin, orange red within, and bitter. Twigs are stout, green, and finely hairy.

The alternate leaves have stout green, finely hairy petioles. Blades are 6–12 inches long and 3–6 inches wide, slightly thickened, the border deeply lobed and toothed, the lobes and base short-pointed, the upper surface green and almost hairless, the lower surface blue green and densely fine hairy with very thick midvein.

The flower clusters (panicles) at ends of twigs are large and much branched, 8–15 inches long, elliptic in shape. Lacking petals, the many slender stalked flowers have 2 greenish elliptic sepals 5/16 inch long, 12–13 or more stamens that shed early, and pistil with stalked 1-celled ovary containing 1 ovule, style, and 2 spreading stigmas. The pods (capsules) separate from an elliptic frame with persistent style. Flowering and fruiting through the year.

The wood is brown to orange red, soft, with large pith. Elsewhere the sap has served locally as a dye and in home medicines.

Uncommon and scattered in openings and thickets in upper Cordillera forest at 1,000–3,000 feet altitude in central mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Maricao, Río Abajo, Toro Negro.

RANGE.—Greater Antilles, St. Kitts to St. Vincent, and from Mexico to Costa Rica and Colombia. Recorded as introduced in Hawaii.

OTHER COMMON NAMES.—panapen cimmarón, pasilla (Puerto Rico); yagrumo macho, palo de toro, gengibrillo, llorasangre (Dominican Republic); palo amarillo, yagrumita, palo de pan cimarrón (Cuba); gordolobo, calderón, llorasangre (Mexico); sangre de toro, camotillo (Guatemala); guacamayo, tabaquillo (Costa Rica); celidueña, celedonia, trompeto, golondrinia (Colombia); celandine, John-Crow-bush (Jamaica); bois codine, bois de coq (Haiti).

The Spanish common name may be derived from the slight resemblance of the leaves to those of breadfruit.

342. Pan cimarrón *Bocconia frutescens* L.

Flowering twig (above), fruiting twig (below), two-thirds natural size.

CAPER FAMILY (CAPPARACEAE)

Herbs, shrubs, woody vines, and small to medium-sized trees, known by: (1) leaves alternate, simple or palmate with 3–7 leaflets, with minute or spiny stipules or none; (2) flowers often large, in unbranched clusters (racemes), bisexual, regular or irregular, generally with 4 sepals, 4 rounded or elliptic petals commonly white, that shed early, 4 to many very long threadlike stamens, and pistil generally on a long stalk with superior 1-celled ovary with 2 placentas and few to many ovules and style; (3) fruit a capsule sometimes like a pod or berry; and (4) sometimes with slightly disagreeable odor. The family name is spelled Capparidaceae also). Also vol. 1, p. 132.

Key to species

A. Petiole enlarged at both ends and often joining blade slightly above base, leaves oblong, 3–10 inches long; flowers few along twigs mostly back of leaves; fruit a ball 1½–2 inches in diameter—348. *Morisonia americana*

AA. Petiole mostly not enlarged at ends (except in No. 76), joining blade at base; flowers few in terminal cluster or at base of upper leaves—*Capparis*.

B. Leaves with minute scales beneath, narrowly elliptic, mostly 2–4 inches long; scales also on twigs, flowers and fruits; fruit narrowly long cylindrical, to 8 inches long.

C. Leaves with upper leaf surface shiny green, lower leaf surface densely covered with silvery scales—53. Burro prieto, Jamaica caper, *Capparis cynophallophora* L.

CC. Leaves with upper leaf surface only slightly shiny, lower leaf surface gray green and scaly—347 *Capparis indica*.

BB. Leaves without scales or hairs.

D. Leaves slightly thickened, elliptic, 1½–4½ inches long, blunt or short-pointed at both ends; fruit elliptic, 1¼–2½ inches long and ½–1 inch in diameter—343. *Capparis amplissima*.

DD. Leaves thick and leathery.

E. Leaves notched at base.

F. Leaves broadly elliptic, 1¾–4¼ inches long, blunt, rounded, or notched at apex; fruit an oblong, slightly flattened pod 4–8 inches long and to 1¼ inches wide—346. *Capparis hastata*.

FF. Leaves elliptic to narrowly obovate, 3–8 inches long, short-pointed at apex; fruit short, 1–3 inches long and ⅜ inch broad—345. *Capparis frondosa*.

EE. Leaves rounded or short-pointed at base, of varying shapes from narrowly oblong to elliptic 1¾–4 inches long, blunt, rounded or slightly notched at apex; fruit long, narrowly cylindric 3–9 inches long and ½ inch in diameter—344. *Capparis flexuosa*.

343. Burro blanco — *Capparis amplissima* Lam.

This tree of dry forests is identified by: (1) elliptic leaves 1½–4½ inches long and 1–2¼ inches wide, slightly thickened and leathery; (2) whitish flowers with 4 oblong petals and many white stamens spreading to 2½ inches across; and (3) gray dry elliptic fruits 1¼–2½ inches long and ½–1 inch in diameter, hanging down on long slender stalks.

Evergreen small- to medium-sized tree to 60 feet high and 1 foot in trunk diameter, with spreading crown. The light brown bark is smoothish but slightly fissured into small plates. Inner bark light brown, gritty, with slight spicy taste and odor like radish. The slender twigs are greenish gray, finely hairy or hairless.

The alternate hairless leaves have petioles ¼–⅜ inch long. Leaf blades are blunt or short-pointed at both ends, not toothed on edges, green on upper surface and slightly lighter beneath.

A few flowers are borne in clusters (corymbs) at end of twigs on stalks ¼–⅝ inch long. The pale green calyx consists of 2 rounded sepals ¼ inch long and 2 inner ½ inch long; white oblong petals ¾ inch or more in length; many white stamens 1½–2 inches long, spreading to 2½ inches across; and pistil on a long stalk, with narrow ovary and stigma. The elliptic fruits hang down on long slender stalks 2–2½ inches long from the flower, not narrowed between the seeds, and opening irregularly. Flowering and fruiting intermittently.

The sapwood is light brown or whitish, hard and heavy. The wood is used for posts.

Uncommon in dry forests of south slopes at 500–1,000 feet altitude in Puerto Rico. Rare near Hatillo on north coast. Also Vieques (sea level), St. Thomas, St. John, and Virgin Gorda.

PUBLIC FORESTS AND PARK.—Guánica, Susúa; Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands and Dominica.

OTHER COMMON NAMES.—burro, sapo, palitaguán (Puerto Rico); matabecerro (Dominican Republic).

BOTANICAL SYNONYM.—*Capparis portoricensis* Urban.

343. Burro blanco *Capparis amplissima* Lam.

Fruit (above), twig with flower buds (below), natural size.

344. Palinguán, limber caper ***Capparis flexuosa* (L.) L.**

Usually a shrub, often vinelike, sometimes a small tree, this species is characterized by: (1) leaves of varying shapes from narrowly oblong to elliptic or linear, leathery, dull green and hairless, alternate in 2 rows; (2) few terminal flowers nearly 2 inches across the 4 spreading white to pink petals and with many spreading white threadlike stamens 1½–3 inches long; and (3) long, narrowly cylindric pod 3–9 inches long and about ½ inch in diameter, rusty brown but reddish within.

An evergreen shrub, often vinelike with slender stem climbing on trees, or a small tree to 20 feet high and 5 inches in trunk diameter. The bark is gray, smooth, the inner bark light yellow, with spicy taste like horseradish. Twigs are often slightly zigzag, green, turning to light gray with dark dots (lenticels), hairless.

Leaves are alternate in 2 rows, hairless, with minute paired scale stipules and with petioles ¼ inch or less in length. Blades vary from narrowly oblong to elliptic, 1¾–4 inches long and ½–2 inches wide, or narrow and linear on shoots and young plants, the apex blunt, rounded, or slightly notched, the base rounded or short-pointed, border not toothed, the upper surface dull green, lower surface dull light green.

Flower clusters (corymbs) are terminal with few fragrant flowers short-stalked, opening in late afternoon and night and closing in late morning. The flower consists of calyx of 4 rounded yellowish sepals ¼ inch long, united at base; corolla of 4 white to pink petals ⅝–1 inch long; many spreading white threadlike stamens 1½–3 inches long; and pistil at the end of a long stalk 2–2½ inches long, the narrowly cylindric yellowish ovary about ¼ inch long, 1-celled with many ovules, ending in flat stigma. The long pod hangs down on a slender stalk 2–2½ inches long beyond base of flower and is slightly narrowed between the seeds. It opens late exposing the red pulp and many green seeds. Flowering probably through the year.

The sapwood is light brown and hard. The root reportedly has the taste of horseradish and has been used in home remedies.

Common in dry and moist coastal and limestone forests from sea level to 1,000 feet altitude along both coasts of Puerto Rico. Also Mona, Desecheo, Muertos, Icacos, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Guánica, Susúa, Vega, Estate Thomas; Buck Island Reef, Virgin Islands.

RANGE.—Southern Florida including Florida Keys and from Bahamas through West Indies to Barbados and Trinidad and Tobago. Also from northern Mexico through Central America to Brazil, Argentina, and Peru.

OTHER COMMON NAMES.—burro, palo de burro (Puerto Rico); bottle wiss (Tortola); frijol de monte (Dominican Republic); palo barba de indio, mostacilla (Cuba); potal (Guatemala); cansa caballo (Venezuela); naranjuelo (Colombia); limber caper, caper-tree, dog caper, bay-leaved caper (United States); caper-tree (Bahamas); mabouya (Trinidad and Tobago); bois rave, bois moutarde (Haiti); bois malouge (Guadeloupe).

BOTANICAL SYNONYM.—*Capparis cynophallophora* L. (1759, not 1753).

344. Palinguán, limber caper *Capparis flexuosa* (L.) L.

Flowering twig (above), fruit (below), two-thirds natural size.

345. Sapo, rat-bean ***Capparis frondosa*** **Jacq.**

From the other native species of the genus this species of burro is distinguished by: (1) leaves elliptic to narrowly obovate, leathery, 3–9 inches long and 1¾–4 inches broad, without hairs or scales, slightly notched at base, the upper surface dull green with midrib and the few curved lateral veins all sunken, the petioles unequal in length; (2) flowers about ½ inch long, with 4 pale greenish white or purplish petals and the stamens only slightly longer than the petals; and (3) fruit like a bean pod, short, 1–3 inches long and ⅜ inch broad, oblong, irregularly narrowed between seeds.

Evergreen shrub or small tree to 15 feet high and 2 inches in trunk diameter, in Culebra to 25 feet and 4 inches in diameter, and in Vieques to 45 feet and 6 inches. The bark is brownish gray, smooth to slightly fissured and slightly warty. Inner bark is light yellow, slightly peppery in taste. Twigs are light gray, hairless, becoming slightly fissured. The internodes are of unequal length, with leaves clustered where internodes are short and separated by others long.

The alternate leaves have green petioles of varying length, ⅛–2¼ inches, round and swollen at both ends. Blades are elliptic or narrowly obovate and broadest beyond middle, leathery, hairless, short-pointed at apex, slightly notched or heart-shaped at base, edges not toothed, upper surface dull green with sunken veins, and lower surface dull light green with veins slightly raised.

Few to several short-stalked flowers are borne in clusters (corymbs) terminal or at base of upper leaves. The flower is composed of calyx of 4 rounded light brown sepals 1/16 inch long; corolla of 4 rounded petals ⅜ inch long, pale greenish white or purplish; about 50 white stamens slightly longer than petals; and stalked pistil with cylindric green ovary ⅛ inch long, 1-celled with many ovules, and dot stigma.

The beanlike fruits (berries) are borne a few together, each with stalk about ¼ inch long above calyx as well as longer flower stalk. Mature fruits are brown, slightly soft, and break open irregularly. Within the whitish pulp are a few rounded dark brown seeds about ¼ inch in diameter. Flowering and fruiting intermittently through the year.

The wood is whitish and slightly soft.

Common locally in dry coastal, dry limestone, and lower Cordillera forests from sea level to 1,500 feet altitude, on southern coast and southern slopes of central mountains in Puerto Rico. Also in Culebra, Vieques, St. Croix, St. Thomas, St. John (reported many years ago), Jost Van Dyke, and Tortola.

PUBLIC FORESTS AND PARK.—Guánica, Susúa; Virgin Islands.

RANGE.—Greater Antilles, Virgin Islands, and Lesser Antilles from Barbuda to Trinidad. Also from Mexico to Colombia, Venezuela, and French Guiana.

OTHER COMMON NAMES.—burro (Puerto Rico); palo verraco (Cuba); quita-calzón (El Salvador); rope (Grenadines); bois bourrique, saint-esprit (Haiti).

BOTANICAL SYNONYM.—*Capparis baducca* auth.

345. Sapo, rat-bean *Capparis frondosa* Jacq.

Fruiting twig (above), flowers (lower right), two-thirds natural size.

346. Burro ***Capparis hastata* Jacq.**

This small tree or shrub is characterized by: (1) thick, leathery, broadly elliptic leaves notched or rounded at base and blunt, rounded, or notched at apex, dull green and hairless, alternate in 2 rows; (2) few terminal flowers nearly 2 inches across the 4 spreading white petals and with many spreading white threadlike stamens 2–3 inches long; and (3) fruit an oblong, slightly flattened pod 4–8 inches long and 1¼ inches wide, red when mature and open.

An evergreen small to medium-sized tree to 50 feet high and 1 foot in trunk diameter or a shrub. Bark smoothish, gray or brown, the inner bark light brown, with slight taste of horseradish. Twigs stout, with minute hairs, green when young, becoming light gray or brown with many raised dots (lenticels), sometimes slightly zigzag.

Leaves alternate in 2 rows, with minute paired scale stipules and with stout brownish, minutely hairy petioles ¼–⅜ inch long. Blades elliptic to nearly round, 1¾–4¼ inches long and 1¼–2¾ inches wide, thick, leathery, often stiff, border not toothed, upper surface dull green or slightly shiny and with the sides slightly turned up at midrib, the lower surface dull light green.

Flower clusters (corymbs or racemes) are terminal, with few to several flowers on stout green stalks ½–1 inch long, opening at night, 1 at a time. The flower is composed of cup-shaped calyx ⅜ inch long and broad, greenish with 4 rounded yellow lobes ¼ inch long; corolla of 4 oblong concave whitish petals about 1–1½ inches long, tinged with green; many white threadlike stamens 2–4 inches long, spreading more than 4 inches across; the pistil at the end of a long stalk 2–3 inches long, the narrowly cylindric yellowish ovary 3/16 inch long, 1-celled with many ovules, ending in flat stigma.

Fruit hanging on a long stalk from 2–3 inches beyond base of flower, an oblong heavy pod 4–8 (sometimes 10) inches long, becoming slightly flattened and up to 1¼ inches wide, red, splitting open on 2 lines. In the dark red juicy pulp are many whitish elliptic seeds about ½ inch long, arranged in 2 rows. In flower and fruit nearly through the year.

The sapwood is light brown and hard. The wood has been used for posts.

Sometimes planted as an ornamental roadside tree in Puerto Rico.

Common in dry coastal, limestone, and lower Cordillera forests from sea level to 1,000 feet altitude of south coast and southern slopes and east end of Puerto Rico. Also Palominos, Vieques, Culebra, St. Croix, St. Thomas, St. John, and Jost Van Dyke.

PUBLIC FOREST AND PARKS.—Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, and from Antigua to Grenada and Trinidad. Also Curacao, Venezuela, and Colombia.

OTHER COMMON NAMES.—sapo (Puerto Rico); contra, arará, paniagua (Venezuela); mabouya (Trinidad).

BOTANICAL SYNONYM.—*Capparis coccolobifolia* Mart.

346. Burro

Capparis hastata Jacq.

Flowering twig (left), natural size; fruit (right), one-half natural size.

347. Sapo prieto, linguam ***Capparis indica*** **(L.) Fawc. & Rendle**

A shrub or small tree of relatively dry lowlands, identified by: (1) minute brown scales on twigs, petioles, lower leaf surfaces, flower stalks, flowers, and fruits; (2) narrowly elliptic, slightly leathery leaves short-pointed or blunt at both ends, gray green and slightly shiny on upper surface, gray green beneath; (3) whitish flowers turning red, about ¾ inch across the 4 petals and 2 inches across the long threadlike spreading stamens, in flattened clusters at or near ends of twigs; and (4) long, narrowly cylindric, silvery-brown pods 3–8 inches long and ¼ inch in diameter. From its close relative No. 53, burro prieto or Jamaica caper, *Capparis cynophallophora* L., this species is distinguished by: (1) bark light gray instead of dark; (2) the leaves only slightly shiny above and the lower surface gray green with the scales not forming a solid silvery-brown coat; and (3) the flowers with shorter calyx only ⅛ inch long, the lobes overlapping, and the petals densely hairy instead of scaly.

An evergreen small tree becoming 20 feet tall and 4 inches in trunk diameter or larger. The bark is gray or light brown and smoothish, the inner bark yellow or red and bitter. Twigs are angled, covered with minute brown and silvery scales, becoming gray. The narrow pointed buds are formed of minute leaves without stipules.

The alternate leaves have scaly petioles ¼–⅝ inch long, grooved above. Blades are 2–4½ inches long and ¾–1¾ inches wide, not toothed on edges, with upper surface green, hairless, and slightly shiny, the lower surface gray green with many minute scales not forming a solid coat.

Flower clusters (corymbs) are branched and flattened at or near ends of twigs, with several slightly fragrant flowers on scaly stalks. The flower is composed of brown scaly calyx ⅛ inch long, deeply 4-lobed, the lobes overlapping and open in bud; corolla of 4 elliptic petals nearly ½ inch long, whitish but turning red, densely hairy on both sides; about 20 slender white stamens 1 inch long, with yellow anthers, soon withering; and pistil on a long whitish stalk about ⅞ inch long, the ovary nearly ¼ inch long, narrowly cylindric and scaly, 1-celled with many ovules, and ending in flat stigma.

The scaly pod hangs down on a slender stalk more than 1 inch long beyond base of flower. It opens irregularly on 2 sides, is red within, and is slightly narrowed between the blackish seeds, which are elliptic and about ¼ inch long. Flowering and fruiting intermittently.

The sapwood is light brown and hard.

Common in thickets, dry coastal and limestone regions from sea level to 500 feet altitude in southern and eastern Puerto Rico. Also in Desecheo, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Guánica, Susúa, Estate Thomas; Buck Island Reef, Virgin Islands.

RANGE.—Jamaica, Hispaniola, Puerto Rico and Virgin Islands, Lesser Antilles from St. Barts and Barbuda to St. Vincent, The Grenadines, and Barbados. Also from Mexico to Venezuela and Dutch Antilles.

OTHER COMMON NAMES.—burro (Puerto Rico); colorín, vara prieta, palo zapo, taiche (Mexico); endurece maíz (Nicaragua); curumo, guacoco (El Salvador, Panama); naranjuelo, pachaca, olivo macho (Colombia); olivo (Venezuela); bois de mêche, bois puant (Guadeloupe); white willow (Barbados); bois noir (Martinique); paaloe pretoe, raba, stokki (Curacao).

47. Sapo prieto, linguam *Capparis indica* (L.) Fawc. & Rendle

Flowering twig (left), fruits (right), natural size.

348. Rat-apple ***Morisonia americana*** L

This shrub or small tree grows in the dry forests of the Virgin Islands, also Culebra, Vieques, and Desecheo, and is rare in southwestern Puerto Rico. It is characterized by: (1) oblong shiny leathery leaves varying greatly in size and hanging down, the petioles of unequal length, enlarged at both ends and often joining blade slightly above base; (2) few flowers in clusters along twigs back of leaves, nearly 1 inch wide, with 4 white petals; and (3) fruit a hard light greenish brown ball 1½–2 inches in diameter, hanging down from stout stalk along twigs back of leaves. Similar to No. 345, sapo, rat-bean, *Capparis frondosa* Jacq., except for the large round fruit and shiny leaves.

Evergreen shrub or small tree becoming 25 feet high and 4 inches in trunk diameter, sometimes partly climbing on trees. The bark is gray to blackish, smooth to slightly fissured, the inner bark light brown, with peppery taste. The stout light gray or light brown twigs are covered with minute scales.

The alternate leaves have yellowish petioles ½–2½ inches long, of unequal length and round and enlarged at both ends, covered with minute scales. Blades are 3–10 inches long and ¾–3¾ inches broad, oblong, stiff and leathery, hairless, short-pointed or rounded at apex, the base rounded or often slightly cup-shaped from attachment to petiole slightly above base, border not toothed, with few curved lateral veins, the upper surface shiny green, and the lower surface dull light green.

Several short-stalked flowers are borne in lateral clusters (corymbs) about 1 inch long at leaf bases and along twigs back of leaves, the flowers and stalks covered with minute scales. The flower consists of greenish yellow scaly calyx ¼ inch long, which covers the elliptic bud and breaks open into 2 parts; corolla of 4 white rounded petals about ½ inch long scaly outside and hairy within; about 20 or fewer stamens attached on a disk; and hairy pistil on a stalk, with narrow cylindric ovary 1-celled with man ovules and flat rounded stigma.

The fruit (berry) has a stout stalk about ½ inch long from inside the flower, separated b an enlarged ring from the less stout flowe stalk. The hard fruit covered with minute scale does not open, except perhaps by decay or actio of animals. Inside the whitish wall more tha ⅛ inch thick are many elliptic light brow seeds about ⅜ inch long, in thin whitish juic pulp which is slightly aromatic and peppery i taste. Flowering and fruiting intermittentl

The wood is light brown and hard.

In other regions this small tree is an orna mental in plazas, along avenues, and nea homes. It has a domelike crown and show coloration, is drought-resistant, and grow slowly.

Common locally on dry slopes and in dry fo ests from sea level to 600 feet altitude. De secheo, southwestern Puerto Rico, Culebra, an Vieques. Also St. Croix, St. Thomas, St. Joh Jost Van Dyke, and Tortola.

PUBLIC FOREST AND PARKS.—Guánica; Virgi Islands, Sage Mountain.

RANGE.—Hispaniola, Desecheo, Puerto Ric Culebra, Vieques, Virgin Islands, and Lesse Antilles from St. Martin, St. Barts, and Sab to Trinidad. Also from Mexico to Nicaragu and from Colombia to Venezuela, Aruba, an Ecuador.

OTHER COMMON NAMES.—rat-apple (Virgi Islands, Saba); guarapo, aguacatillo (Domin can Republic); chico (Mexico); cacao mic (Nicaragua); naranjito, níspero de saino, pa galleta, toco (Colombia); zorrocloco, pachac (Venezuela); sapote de perro (Ecuador); s potille marrow (Trinidad); wild misple (Dutc Antilles); jumbie sapodilla, dog sapodilla (Th Grenadines).

The genus honors Robert Morison (1620 1683), professor of botany at Oxford Unive sity, England.

HORSERADISH-TREE FAMILY (MORINGACEAE*)

Trees of only 1 genus (*Moringa*), known by: (1) leaves alternate, twice or three times pinnate, deciduous, the stipules like glands or none; (2) many showy, mostly white flowers in branched clusters (panicles), bisexual, slightly irregular, with very short cup (hypanthium) that bears 5 unequal sepals, 5 unequal petals, 5 stamens and 3–5 staminodes inserted on disk, and pistil with superior 1-celled ovary, parietal placentas and many ovules, and slende style; and (3) fruit a long 3-angled capsule th opens in 3 lines, with many large seeds ofte winged. Vol. 1, p. 134.

One species: 54. Resedá, horseradish-tre *Moringa oleifera* Lam.*

48. Rat-apple *Morisonia americana* L.

Leafy twig (above), fruits and flowers (below), two-thirds natural size.

BRUNELLIA FAMILY (BRUNELLIACEAE)

Trees, sometimes shrubs, known by: (1) opposite or whorled leaves, odd pinnate or sometimes simple, toothed, commonly hairy, sometimes spiny, with stipules; (2) small greenish flowers in branched clusters (panicles), male and female on different plants (dioecious), regular, with 4–5-lobed calyx, no corolla, 8–10 stamens inserted on base of lobed disk, and in female flowers 5 separate pistils with 1-celled ovary containing 2 ovules, and curved style; and (3) fruits 5 or fewer follicles with 1–2 seeds. Vol. 1, p. 136.

One species: 55. Palo bobo, *Brunellia comocladifolia* Humb. & Bonpl.

CUNONIA FAMILY (CUNONIACEAE)

Trees and shrubs, known by: (1) opposite or whorled leaves, odd pinnate with leaflets paired except the terminal, or with 3 leaflets, rarely simple, often toothed, with stipules sometimes large and united in pairs; (2) small bisexual regular flowers, generally with 4–5 sepals, 4–5 petals often lobed and mostly smaller than sepals (or none), 8–10 to many stamens on a disk, and pistil with superior ovary generally 2(–5)-celled with few to many ovules, and 2(–5) styles (or 1–5 simple pistils); and (3) fruit a 2(–5)-celled capsule or nut with few to many minute seeds. Vol. 1, p. 138.

One species: 56. Oreganillo, *Weinmannia pinnata* L.

ROSE FAMILY (ROSACEAE)

Trees, shrubs, and herbs, known by: (1) leaves alternate, generally simple, with paired stipules; (2) small to large bisexual flowers, usually regular or sometimes slightly irregular, generally with cuplike base (hypanthium) that bears 5 sepals, 5 petals, and many (sometimes 10) separate stamens, and with 1 to many simple pistils or 1 compound pistil with mostly superior 2–5-celled ovary with few ovules, and 2–5 styles; and (3) fruit various, a drupe, pome, akene, or follicle. Also vol. 1, p. 140.

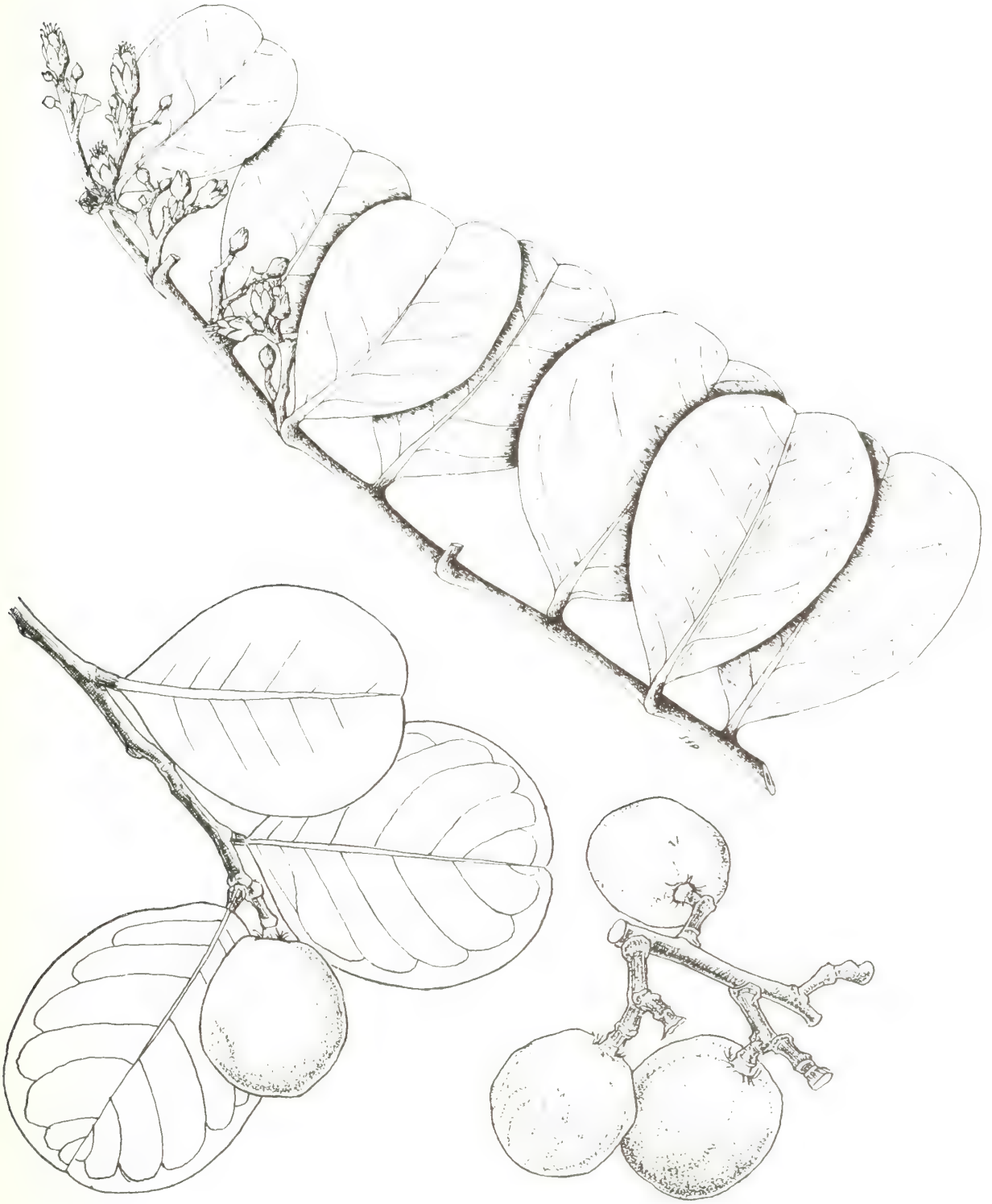
Key to species

A. Leaves rounded or slightly notched at apex, elliptic or nearly round, thick and leathery, turned upward—349. *Chrysobalanus icaco.*
AA. Leaves mostly long-pointed at apex, mostly oblong or ovate, thin (except No. 350), spreading.
  B. Petioles less than ⅛ inch long.
    C. Leaves with saw-toothed edges, brownish woolly beneath—350. *Eriobotrya japonica.**
    CC. Leaves not toothed on edges, hairy on veins beneath—*Hirtella.*
      D. Leaves with veins much sunken in upper surface and raised beneath; twigs bristly hairy; fruit dark red—57. Icaquillo, *Hirtella rugosa* Pers.
      DD. Leaves with veins not sunken; twigs finely hairy; fruits blackish—351. *Hirtella triandra.*
  BB. Petioles ¼–½ inch long; crushed foliage with taste and odor of almond—*Prunus.*
    E. Leaves ovate, 2–4½ inches long; fruit rounded, about ½ inch in diameter—352. *Prunus myrtifolia*
    EE. Leaves oblong-elliptic, 4–8 inches long; fruit elliptic, ¾–1 inch long—353. *Prunus occidentalis.*

349. Hicaco, coco-plum — *Chrysobalanus icaco* L

Hicaco or coco-plum is characterized by: (1) numerous shiny, dark green thick and leathery, elliptic or nearly round leaves 1½–3¼ inches long and 1–2¼ inches broad, alternate in 2 rows and turned upward along twig, the visible lower surfaces yellow green; (2) small greenish white flowers less than ⅜ inch long, several in clusters at leaf bases; and (3) the elliptic or nearly round, pink, whitish, or dark-purplish fruits ¾–1½ inches long, juicy and edible, containing 1 large 5–6-ridged brown stone and an edible white seed.

Evergreen and mostly shrubby with several stems from base to 10 feet in height, or creeping when growing on sandy beaches. Sometimes becoming a much-branched small tree to 15 feet tall and 4 inches in trunk diameter, with dense crown, especially in cultivation inland. The bark is brown or gray, smoothish or becoming scaly, and astringent. The twigs are green



49. Hicaco, coco-plum *Chrysobalanus icaco* L.

Flowering twig (above), fruiting twig (lower left), fruits (lower right), natural size.

and hairless when young, turning reddish brown, with raised dots (lenticels).

The leaves are alternate on short stout petioles 1/8 inch long. Leaf blades are rounded or slightly notched at apex and short-pointed at base, and yellow green beneath.

Flower clusters (cymes) near ends of twigs are 1–1½ inches long, shorter than the leaves. The finely hairy, light green, bell-shaped base (hypanthium) is nearly 1/8 inch long and the 5 spreading pointed sepals the same length; there are 5 narrow white petals 3/16 inch long, shedding early; about 20 hairy white stamens 1/4 inch long, united into tube at base; and pistil of green hairy 1-celled ovary with 2 ovules and slender hairy style 1/4 inch long attached at base.

The soft fruits (drupes) resembling plums have a whitish, thin and spongy, slightly sweet or almost tasteless flesh, astringent until mature. Immature fruits are light green and 5–6-angled. The nutlike edible seeds weigh about 80 to a pound. Flowering and fruiting nearly through the year.

The wood is described as light brown, hard and heavy (specific gravity about 0.8). It is not used in Puerto Rico but elsewhere has been employed in carpentry.

Occasionally planted as an ornamental shrub and for the fruits. These are commonly prepared as preserves or made into jelly but are edible raw. Also the nutlike seeds have a high oil content and can be eaten. It is reported that the Carib Indians strung them on sticks and burned them like candles. Various parts of the plant are astringent and have served in folk medicines. A honey plant. Elsewhere the shrubs have been used for stabilization of sand dunes.

Locally common forming thickets on coastal lowlands and sandy beaches and elsewhere on shallow wet soils from sea level to 1,500 feet altitude in eastern mountains of Puerto Rico, also islands eastward. Also Icacos (this island apparently named for the species), Vieques, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Aguirre, Boquerón, Cambalache, Carite, Luquillo, San Juan; Virgin Islands, Sage Mountain.

RANGE.—Southern Florida including Florida Keys and throughout West Indies from Bahamas and Cuba to Trinidad and Tobago. Also from Mexico to Brazil and Ecuador. Native of sea coasts but the range extended by planting inland. Also a closely related species in western Africa.

OTHER COMMON NAMES.—hicaco, icaco, jicaco (Puerto Rico, Spanish); coco-plum (Virgin Islands, English); icaco de costa, icaco dulce (Cuba); icaco rosado, icaco negro (El Salvador); icaco coco-plum, coco-plum (United States); pork-fat-apple, white-plum (Bahamas); red coco-plum, white coco-plum (St. Barts); fat-pork, icaque, zicaque (Trinidad); zicaque (St. Lucia); icaco (British Honduras); fat-pork, pigeon-plum, kulimiro, caramio (Guyana); zicaque (Haiti); icaque (Guadeloupe, Martinique); prune de Guyane (French Guiana); coco-plum, fat-pork, ecacs (Dutch Antilles); pruim (Surinam); icaco, guajurú, ajurú (Brazil); zicaque, fat-pork (Dominica).

A variety with smaller, purplish black fruits and smaller leaves has been distinguished (*Chrysobalanus icaco* var. *pellocarpus* (G. F. W. Mey.) DC.; botanical synonym, *Chrysobalanus pellocarpus* G. F. W. Mey.).

350. Níspero de España, loquat — *Eriobotrya japonica* (Thunb.) Lindl.*

Loquat is a handsome small tree introduced in Puerto Rico as an ornamental and for its edible fruit. It is recognized by: (1) oblong thick and leathery leaves 5–10 inches long and 1¼–3½ inches wide, toothed on edges, the upper surface shiny with sunken veins, the lower surface covered with soft gray or rusty hairs; (2) many fragrant flowers about ½ inch across the 5 white petals, in terminal branched woolly clusters; and (3) yellow elliptic or pearlike fruits (loquats) 1½–2 inches long, slightly sour and edible.

Evergreen small tree to 20 feet high with shiny green foliage. The bark is gray and slightly fissured. Twigs are light brown and hairy.

The alternate leaves have short stout petioles less than 3/8 inch long. The blades are often broadest beyond middle, short- or long-pointed at both ends, slightly curved up on both sides of midvein, with straight sunken veins ending in teeth.

Flower clusters (panicles) are 4–6 inches long. The flowers about 3/8 inch long are composed of a brown hairy basal cup (hypanthium), which bears 5 rounded brown hairy sepals, 5 white elliptic petals 3/8 inch long, and about 20 white stamens. The pistil has an inferior 5-celled ovary and 5 whitish styles. The fruits (pomes) are hairy when young, slightly shiny, with 5 protuberances and 5 sepals at apex, and contain pale yellow pleasantly acid mealy pulp and few brown elliptic seeds 3/8–3/4 inch long.

Uncommonly grown around houses in Puerto Rico but apparently not adapted as a fruit tree.

50. Níspero de España, loquat *Eriobotrya japonica* (Thunb.) Lindl.*

Flowering twig and fruits (lower left), two-thirds natural size.

The fruits are eaten fresh, cooked, and made into preserves and jelly. The bitter seeds should be removed before cooking. Propagated by seeds and grafting. Classed as a honey plant.

As a commercial fruit tree in orchards, loquat is better suited to subtropical climates of mountains and to warm temperate regions. It is hardy across southern United States from Florida west along the Gulf and to southern Arizona and California. Along the Atlantic Coast it can be grown northward to Philadelphia with some protection in winter. In cold climates also an ornamental in conservatories and a potted plant.

RANGE.—Native of China but introduced in subtropical and warm temperate regions of the world. West Indies, southern United States and from Mexico to Brazil. Also from southern Europe to eastern Asia and Japan.

OTHER COMMON NAMES.—níspero, níspero japonés, níspero del Japón (Spanish); loquat Japanese medlar (English).

351. ***Hirtella triandra*** **Sw.**

This rare shrub or small tree of moist forests is characterized by: (1) lance-shaped to elliptic leaves 2–6 inches long and 1–2¼ inches wide, alternate in 2 rows; (2) many small whitish and pinkish flowers with 3 threadlike stamens ⅝ inch long, in branched terminal clusters; and (3) blackish or purplish oblong flattened hairy fleshy fruits ¾–1 inch long and ¼–5/16 inch wide. To be separated from No. 54, icaquillo, *Hirtella rugosa* Pers., by the erect form (branches not drooping), softer pressed hairs, and smoother flattened leaves with veins not sunken.

Evergreen shrub 10–15 feet high or a small tree to 40 feet high and 6 inches in trunk diameter. Bark gray smooth, the inner bark pink. Twigs slender, finely hairy, with lighter dots (lenticels).

The alternate leaves have paired minute narrow hairy stipules ⅛–3/16 inch long and hairy petioles ⅛ inch long. Leaf blades are long-pointed at apex, short-pointed or rounded at base, slightly wavy on edges, thin, hairy on midvein, the upper surface green, and the lower surface paler and finely hairy.

Flower clusters (panicles) are 1½–4 inches long, the branches finely hairy. The finely hairy flowers on short hairy scaly stalks have a basal tube (hypanthium) about ⅛ inch long; 5 rounded sepals ⅛ inch long and bent down, 5 elliptic white petals 3/16 inch long and shedding early; 3 threadlike pink or purplish stamens ⅝ inch long; and pistil with densely hairy 1-celled ovary and threadlike style attached near base. The dry drupelike fruits have calyx at base, thin sweetish edible pulp, and 1 large pointed seed with fine grooves. With flowers and fruits through the year.

The wood is light brown, hard, and heavy, elsewhere used in construction.

Rare in lower Luquillo, moist limestone, and lower and upper Cordillera forests at 200–2,000 feet altitude in moist lowlands and upper western mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guajataca, Luquillo, Maricao, Río Abajo, Toro Negro.

RANGE.—Cuba, Hispaniola, Puerto Rico, and Lesser Antilles from Saba and St. Kitts and Nevis to Trinidad. Also from southern Mexico and British Honduras to Surinam, Brazil, Bolivia, Peru, and Ecuador.

OTHER COMMON NAMES.—cocuyo (Dominican Republic); siguapa, icaquillo, icaco de aura (Cuba); barazón (Nicaragua); camaroncillo conejo (Panama); pasito (Colombia); mere curillo, freso, icaquillo, caramate negro (Venezuela); vara rosada (Ecuador); quinulla (Peru); fruta paloma, cocochat (Trinidad and Tobago); zicaque (Dominica); wild cocoplum wild pigeonplum (British Honduras); icaque à poils, icaque à ramiers, icaque pendant (Guadeloupe); icaque poileur (Martinique); hairy plum (Saba); marisi balli (Surinam).

351. *Hirtella triandra* Sw.

Natural size.

352. Myrtle laurelcherry ***Prunus myrtifolia*** **(L.) Urban**

This rare small tree of mountain forests is identified by: (1) elliptic to ovate leaves 2–4½ inches long and 1–2 inches wide, with odor and taste (when crushed) of almond; (2) many small flowers 3/16 inch wide, with 5 white petals, in drooping unbranched clusters; and (3) rounded shiny black-purple stone fruit about ½ inch in diameter.

Evergreen small tree 25 feet or more in height and 4 inches in trunk diameter, hairless throughout. The bark is light brown or reddish brown, smooth or slightly fissured. The twigs are slender, orange brown, becoming gray or light brown, with light dots (lenticels).

The alternate leaves have slender leafstalks about ½ inch long and paired narrow pointed stipules ¼ inch long, shedding early. Blades are narrowed to a long blunt point at apex, short-pointed at base, slightly thickened, slightly wavy at borders, shiny yellow green on upper surface, and pale dull green on lower surface.

Flower clusters (racemes) at leaf bases are shorter than the leaves and bear many flowers on stalks ⅛–¼ inch long. The flowers have a basal cup (hypanthium) 1/16 inch long, 5 rounded petals more than 1/16 inch long, many stamens, and pistil with ovary and short style. The fruits (drupes) have thin flesh and large stone. Flowering mostly in spring and summer and maturing fruits in summer.

The hard wood has light brown sapwood, and light red heartwood.

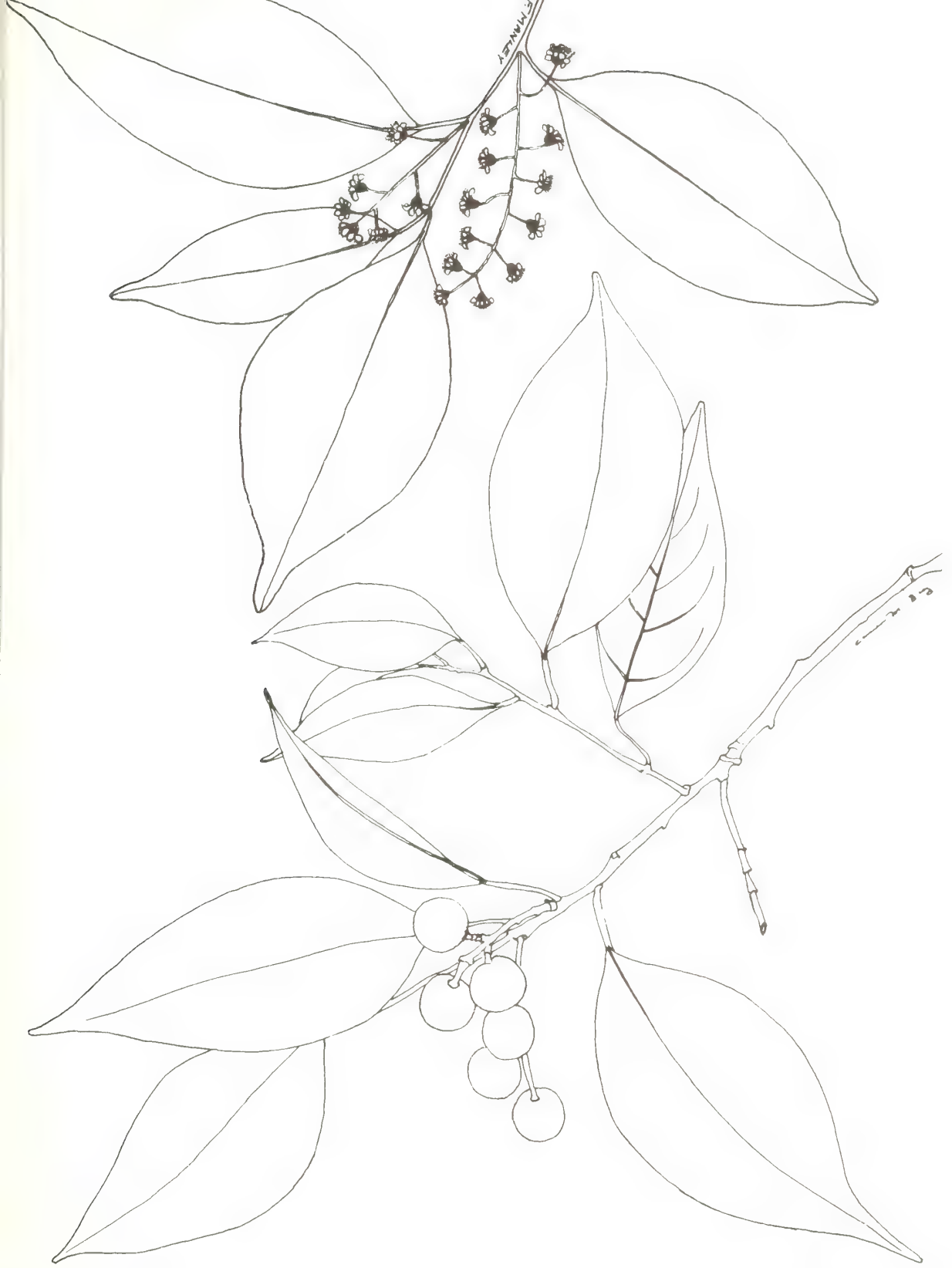
Rare in moist limestone and upper Cordillera forests at 100–2,500 feet altitude in central and western Puerto Rico. Collected in dwarf forest above 4,000 feet altitude at Cerro de Punta, the highest peak of Puerto Rico.

PUBLIC FORESTS.—Cambalache, Guajataca, Maricao, Río Abajo, Toro Negro, Vega.

RANGE.—Southern Florida including Florida Keys, Bahamas, Greater Antilles, St. Eustatius, Montserrat, Guadeloupe, Dominica, Martinique, St. Vincent, and Trinidad. Also from Venezuela to Surinam and Brazil.

OTHER COMMON NAMES.—almendrito, membrillito (Dominican Republic); almendrillo, cuajaní hembra, cuajanincillo (Cuba); almendro (Venezuela); myrtle laurelcherry, West Indian cherry, laurelcherry (United States); wild cassada, cassada-wood, ants-wood (Jamaica); amandier à petites feuilles (Haiti); amandier des bois (Martinique); noyau (Guadeloupe); duraznero de monte, marmelo bravo, marmelo do matto, virarú (Brazil).

BOTANICAL SYNONYMS.—*Laurocerasus myrtifolia* (L.) Britton, *L. sphaerocarpa* (Sw.) Roem., *Prunus sphaerocarpa* Sw.



352. Myrtle laurelcherry *Prunus myrtifolia* (L.) Urban

Flowering twig (above), fruiting twig (below), natural size.

353. Almendrón, West Indies laurelcherry — *Prunus occidentalis* Sw.

Almendrón, a rare large tree of mountain forests, is distinguished by: (1) oblong-elliptic leaves 4–8 inches long and 1½–3 inches wide, in 2 rows, with odor and taste (when crushed) of almond; (2) many small flowers about ¼ inch wide, with 5 white petals in drooping unbranched clusters; and (3) the elliptic stone fruits ¾–1 inch long.

Evergreen large tree to 80 feet high and 2½ feet in trunk diameter, developing large buttresses at base. Bark dark brown, scaly, becoming rough and furrowed. The brown inner bark and the twigs have the taste of almond. Twigs are hairless, green when young, becoming light brown.

The leaves are alternate in 2 rows, hairless, with petioles ¼–½ inch long. The paired narrow pointed stipules ¼ inch long form the bud. The blades are long-pointed at apex and short-pointed or rounded at base, slightly thickened and slightly turned under at edges, the upper surface green and slightly shiny, the lower surface dull light green.

Flower clusters (racemes) at leaf bases are 1½–3½ inches long, bearing many fragrant flowers on slender stalks of about ¼ inch. The flower has a basal cup (hyanthium) more than ⅛ inch long, which bears 5 pointed sepals, 5 white rounded petals about ⅛ inch long, and many stamens more than ⅛ inch long. The pistil has a 1-celled ovary and short style. The fruit (drupe) like an almond has thin flesh and a large stone containing 1 seed. Flowering from February to April and with fruits in spring and summer.

Rare in upper Cordillera forest at 2,000–3,000 feet altitude in central Puerto Rico. One very large tree of this species is at the edge of Villalba-Manatí Highway at kilometer 36, altitude 2,500 feet.

The wood is described as having flesh-colored sapwood and rich dark reddish-brown heartwood. It is very hard, heavy (specific gravity 0.90 to 1.05), of medium to coarse texture, tough, and strong. The wood has been used for construction and elsewhere for cabinetwork, furniture, flooring, posts, poles, implement frames, and railway crossties.

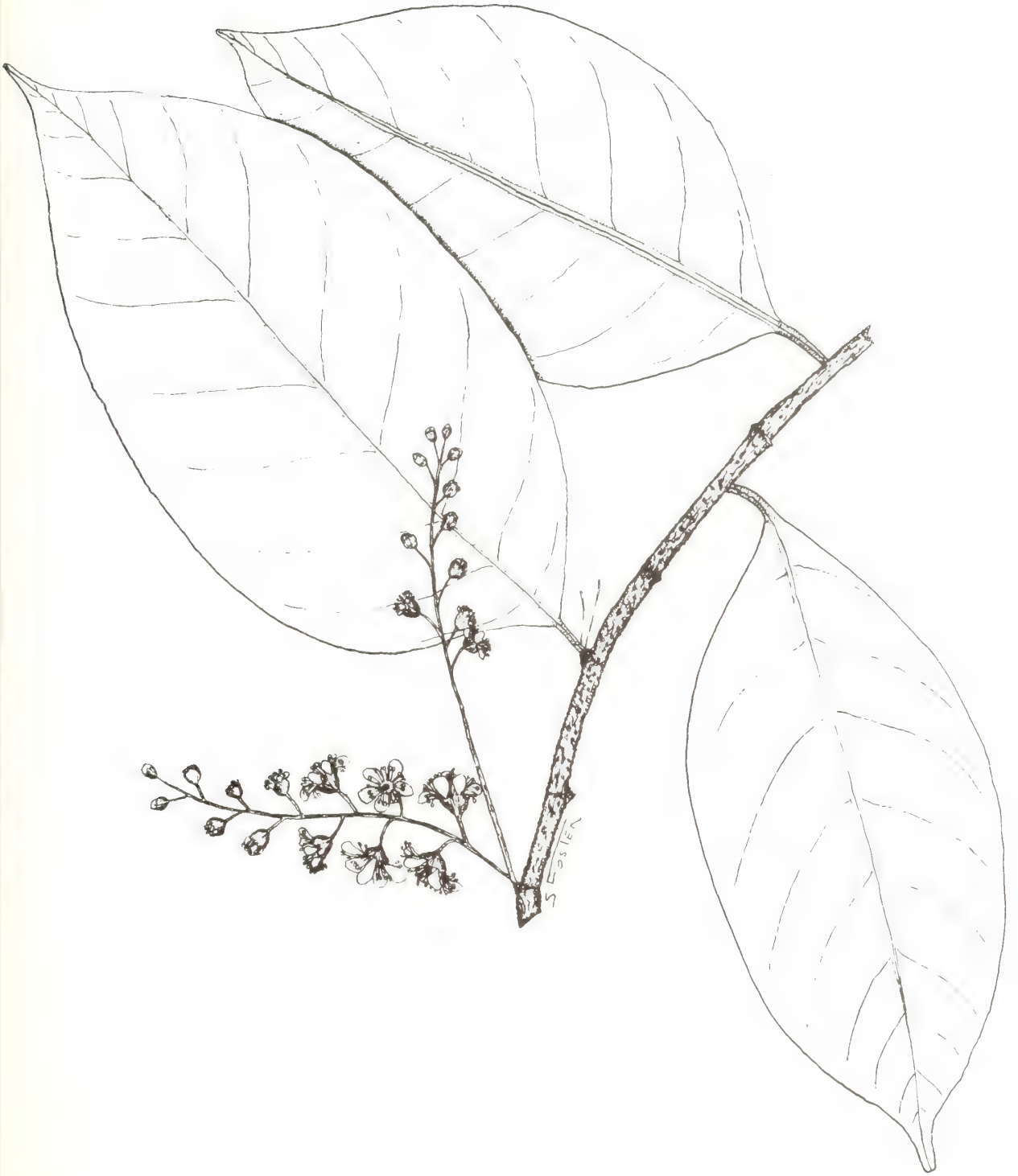
This species has been planted experimentally in forestry. Elsewhere a drink has been made from the cherrylike fruits. Classed as a honey plant.

PUBLIC FORESTS.—Guilarte, Luquillo, Toro Negro.

RANGE.—Greater Antilles and Lesser Antilles from St. Kitts to St. Vincent. Also recorded from Guatemala, Panama, and Venezuela.

OTHER COMMON NAMES.—almendrilo (Puerto Rico); almendro, almendrito, almendrón membrillo (Dominican Republic); almendro, cuajaní, cuajaní macho, juba (Cuba); prune-tree (Jamaica); amandier à grandes feuilles (Haiti); amandier, noyeau (Dominica).

BOTANICAL SYNONYM.—*Laurocerasus occidentalis* (Sw.) Roem.



353. Almendrón, West Indies laurelcherry *Prunus occidentalis* Sw.

Flowering twig, natural size.

LEGUME FAMILY (LEGUMINOSAE)

Herbs, shrubs, and trees, often large, known by: (1) leaves alternate, compound (mostly pinnate, also bipinnate and with 3 leaflets), rarely simple, with paired stipules sometimes becoming spines; (2) flowers small to large and showy, often in racemes, spikes, and heads, bisexual, mostly irregular in shape of bean flower or butterfly (regular in Mimosoideae), the calyx usually tubular with 5 lobes, corolla of 5 unequal petals (equal in Mimosoideae), 10 to many stamens distinct or united at base, and pistil with superior 1-celled ovary containing 2 to many ovules and with slender style; and (3) fruit generally the pod (legume), which opens in 2 lines and contains 1 to many elliptic bean-shaped seeds. Also vol. 1, p. 142.

Key to the 3 subfamilies

A. Flowers regular, with 10 to many long, spreading stamens, separate or united at base; petals meeting by edges in bud; leaves bipinnate (pinnate in *Inga*)—Mimosa Subfamily (Mimosoideae; Mimosaceae), below.

AA. Flowers irregular, with 10 or fewer stamens, often united; petals overlapping in bud.

B. Flowers only slightly irregular; the 5 petals separate, the largest petal innermost in bud; leaves pinnate or bipinnate, sometimes of 2 leaflets or simple—Cassia Subfamily (Caesalpinioideae; Caesalpiniaceae), p. 264.

BB. Flowers very irregular, beanlike or butterfly-shaped; the 5 petals being the standard (largest and outermost in bud), 2 wings, and 2 slightly united forming the keel; leaves pinnate, sometimes of 3 leaflets—Pea Subfamily (Faboideae or Lotoideae; Fabaceae), p. 288.

MIMOSA SUBFAMILY (MIMOSOIDEAE; MIMOSACEAE)

Shrubs and trees, nearly all tropical and subtropical, known by: (1) leaves bipinnate (even pinnate, or paripinnate, in *Inga* and few species of *Pithecellobium*); (2) flowers regular, generally many crowded in a head or spike; (3) petals 5 equal, separate or united in a tube, meeting by edges in bud; and (4) stamens 10 to many, long and threadlike, spreading, and very conspicuous, separate or united at base. Also vol. 1, p. 142.

Key to species

A. Leaves pinnate, the leaflets in pairs (even pinnate)—*Inga.*
  B. Leaf axis winged; leaflets hairy.
    C. Twigs bristly red hairy; flowers bristly hairy; pods to 12 inches long and 2½ inches wide, flattened—364. *Inga fastuosa.**
    CC. Twigs densely brown hairy when young; flowers finely hairy; pods nearly cylindrical, 4-angled—64. Guaba, *Inga vera* Willd.
  BB. Leaf axis cylindrical, not winged; leaflets hairless or nearly so; pods flattened.
    D. Leaflets 4 (sometimes only 2)—62. Guamá, "sweetpea," *Inga fagifolia* (L.) Willd. (*I. laurina*).
    DD. Leaflets usually 6 or 8 (sometimes 4)—63. Guamá venezolano, *Inga quaternata* Poepp. & Endl.*
AA. Leaves bipinnate.
  E. Leaflets very narrow, less than ⅛ inch wide, relatively long.
    F. Twigs with paired spines at some nodes.
      G. Lateral axes (pinnae) 1 or sometimes 2 pairs, each with 12–25 pairs of leaflets ¼–⅝ inch long; spines brown or gray—70. Bayahonda, mesquite, *Prosopis juliflora* (Sw.) DC.*
      GG. Lateral axes 2 to many pairs, each with many pairs of leaflets less than ¼ inch long—*Acacia.*
        H. Lateral axes 2–8 pairs, each with 10–30 pairs of leaflets.
          I. Pods abruptly narrowed at base, cylindrical, 1½–3 inches long and ⅜–½ inch in diameter, dark brown to blackish, hairless, pulpy within—58. Aroma, sweet acacia, *Acacia farnesiana* (L.) Willd.*
          II. Pods narrowed into short stalklike base, cylindrical or flattened, thin and dry.
            J. Pods cylindrical, 3–6 inches long and ¼ inch in diameter, narrowed between seeds, gray, finely hairy—359. *Acacia tortuosa.*
            JJ. Pods flat, 2–6 inches long, 5/16–⅜ inch wide, narrowed between seeds, whitish, finely hairy—357. *Acacia nilotica.**
        HH. Lateral axes 10–40 pairs.
          K. Pods slightly flattened and narrowed between seeds, 2½–4 inches long, ⅜–½ inch wide, dark brown, finely hairy—355. *Acacia macracantha.*
          KK. Pods flattened, 2½–5 inches long, ⅜–⅝ inch wide, hairless—358. *Acacia polyacantha.**
    FF. Twigs not spiny.
      L. Lateral axes (pinnae) no more than 10 pairs.
        M. Leaflets shiny dark green, ⅜ inch long, 20–40 pairs on each of 8–10 pairs of lateral axes—67. Cojoba, *Pithecellobium arboreum* (L.) Urban.
        MM. Leaflets dull green to gray green, 5/16–⅝ inch long.
          N. Pods gradually narrowed from apex to base and opening from apex—*Calliandra.*
            O. Lateral axes 1 pair, with 10–20 pairs of gray-green leaflets; stamens pink to purple—362. *Calliandra surinamensis.**
            OO. Lateral axes 2–6 pairs, each with 10–30 pairs of green leaflets; stamens white—361. *Calliandra caracasana.*
          NN. Pods not gradually narrowed to base.
            P. Pods splitting open along both edges; lateral axes 3–10 pairs, each with 10–20 pairs of leaflets—65. Zarcilla, tantan, leadtree, *Leucaena leucocephala* (Lam.) de Wit (*L. glauca*).
            PP. Pods curved into a circle, not splitting open; lateral axes 4–9 pairs, each with 20–30 pairs of leaflets—363. *Enterolobium cyclocarpum.**
      LL. Lateral axes 12 to many pairs.
        Q. Lateral axes 12–16 pairs, each with 12–30 pairs of leaflets less than ⅜ inch long—360. *Albizia carbonaria.**
        QQ. Lateral axes 20–35 pairs, each with 30–100 pairs of minute narrow leaflets ⅛ inch or less in length—66. Cojóbana, *Piptadenia peregrina* (L.) Benth.
  EE. Leaflets more than ¼ inch broad, less than 4 times as long as broad.
    R. Twigs with paired spines at some nodes; lateral axes (pinnae) 1 pair, each with 1 pair of oblong or obovate leaflets.
      S. Leaflets ⅜–⅝ inch long, thickened, shiny green on both surfaces—354. *Acacia anegadensis.*
      SS. Leaflets ½–2 inches long, mostly thin, dull green above and light green beneath.
        T. Flower heads pinkish or yellowish; native shrub or small tree of coastal thickets—365. *Pithecellobium unguis-cati.*
        TT. Flower heads creamy white; introduced shade tree—68. Guamá americano, guamuchil, *Pithecellobium dulce* (Roxb.) Benth.*
    RR. Twigs spineless; lateral axes (pinnae) 2–7 pairs with many leaflets.
      U. Leaflets slightly diamond-shaped, blunt-pointed at apex, asymmetrical—69. Samán, raintree, *Pithecellobium saman* (Jacq.) Benth.*
      UU. Leaflets oblong, rounded at apex.
        V. Leaflets symmetrical, rounded at both ends, with tiny point at apex—59. Peronías, jumbiebead, *Adenanthera pavonina* L.*
        VV. Leaflets oblique or asymmetrical at base.
          W. Leaflets ⅜–¾ inch long, shiny dark green on upper surface—356. *Acacia muricata.*
          WW. Leaflets ¾–1¾ inches long, dull green on upper surface.
            X. Lateral axes 2–4 pairs, each with 4–9 pairs of leaflets; the flat pods straw colored, more than 1 inch broad—60. Acacia amarilla, tibet, lebbek, *Albizia lebbeck* (L.) Benth.*
            XX. Lateral axes 4–7 pairs, each with 6–14 pairs of leaflets; the flat pods rich red, turning to brown, less than ¾ inch broad—61. Albizia, tall albizia, *Albizia procera* (Roxb.) Benth.*

354. Anegada acacia ***Acacia anegadensis* Britton**

This distinctive small tree known only from Anegada in the British Virgin Islands is recognized by: (1) straight spines 1/8–5/8 inch long paired at nodes and to 3 inches long on trunk and larger branches; (2) bipinnate leaves with only 1 pair of side axes, each with usually 2 paired oblong leaflets 3/8–5/8 inch long and less than 1/4 inch wide; (3) many minute flowers in yellow balls (heads) 1/4 inch in diameter; and (4) narrow curved pods 1 1/4–1 1/2 inches long and 1/4 inch wide.

A deciduous spiny tree to 26 feet high and 5 inches in trunk diameter, with many widely spreading branches. Twigs slender, gray, hairless.

Leaves alternate, pinnate, 3/4–1 1/4 inches long. Stipules paired, developing into slender straight dark brown spines. Petiole 1/8–1/4 inch long, hairless or nearly so, with dot gland at apex, forking into 1 pair of side axes slightly longer and with gland dot at apex, each ending in 1 pair (rarely 2 pairs) of stalkless leaflets. Leaflets oblong, thick and leathery, hairless, unequal and rounded at base, rounded or notched at apex, not toothed on edges, with prominent network of raised veins, shiny dark green on both surfaces.

Flower heads 1–4 on short stalks at leaf bases. Flowers about 1/8 inch long, consisting of minute 5-toothed calyx, narrow tubular 5-toothed yellow corolla 1/16 inch long, about 20 spreading threadlike stamens, and slender pistil. Pods short-stalked, dark brown, hairless, thick-walled, opening late. Seeds few, rounded, 1/8–3/16 inch long, dull brown. Collected with flowers and fruits in February, flowering intermitttently in wet season.

Common on the rocky plain and occasional on the sandy plain in the dry limestone forest at sea level near the west end of Anegada.

RANGE.—Known only from Anegada, the farthest northeast of the British Virgin Islands.

BOTANICAL SYNONYM.—*Fishlockia anegadensis* (Britton) Britton & Rose.

This very different species was discovered in 1913 by N. L. Britton during his exploration of Anegada and was named by him for that island in 1916. Afterwards it was placed also in a new segregate genus, *Fishlockia*. The foliage is not like that of other species of *Acacia* but resembles that of *Pithecellobium*. The closest relative may be in the nearby Bahamas, according to D'Arcy (*17*).

Being confined to one small island, this local species without near relatives is classed as rare and endangered. Also, the vegetation of Anegada is threatened by destruction through proposed real estate developments. Seeds should be collected and distributed to botanical gardens in the West Indies for propagation.

354. Anegada acacia *Acacia anegadensis* Britton

Flowering twig, natural size.

355. Tamarindo silvestre, casha ***Acacia macracantha* Humb. & Bonpl.**

This deciduous tree with thin spreading crown is common in the Virgin Islands but rare in Puerto Rico. It is characterized by: (1) the twigs slightly zigzag, with paired spines, generally short, at some nodes; (2) twice pinnate (bipinnate) leaves 2¾–5½ inches long, with 10–25 pairs of axes, each with 12–30 pairs of minute gray-green leaflets less than ⅛ inch long; (3) orange balls ⅜ inch in diameter, of many minute flowers; and (4) pod 2–4 inches long, slightly flattened and slightly curved, reddish brown, minutely hairy.

A deciduous tree, small or medium-sized to 30 feet high and 1 foot in trunk diameter, with thin spreading crown broader than high or only a shrub. The trunk is slightly angled with grooves, with gray outer bark. The twigs are covered with minute gray-green hairs becoming dark brown with light dots.

The alternate bipinnate leaves have paired minute stipules, some of which become minute dark brown flattened spines ⅛–⅜ inch long, sometimes to 1–2 inches or more. The axes are hairy gray green, the secondary axes paired, ⅝–¾ inch long. Leaflets very numerous, stalkless, minute, oblong, hairy beneath.

The balls (heads) of flowers are inserted 1–5 on stalks ⅜–¾ inch long at the base of the leaves, composed of many minute stalkless flowers, somewhat fragrant. The flower 3/16 inch long is formed by the calyx less than 1/16 inch long, corolla less than ⅛ inch long, both tubular, greenish yellow, hairy, and 5-toothed; many tiny separate orange stamens 3/16 inch long; and pistil 3/16 inch long with narrow greenish ovary and thin white style. The pod, which does not open, measures ⅜–½ inch wide and 3/16 inch thick. Seeds several, elliptic, brown, less than ¼ inch long. Flowering intermittently and with fruits persisting through the year.

The wood is reported to be very durable. It is used for posts and elsewhere for construction and charcoal.

The plants can be grown and pruned as hedges.

Locally common in dry lowlands, forming costal thickets, from sea level to 500 feet altitude in Muertos, Vieques, Culebra, and Virgin Islands, including St. Croix, St. Thomas, St. John, Tortola, and Jost Van Dyke. Rare in Puerto Rico, for example, at Cambalache.

PUBLIC FORESTS AND PARK.—Cambalache, Estate Thomas; Virgin Islands.

RANGE.—Bahamas, Greater Antilles, Virgin Islands, and through Lesser Antilles to Grenada and Barbados. Also northern South America from Colombia and Venezuela to Ecuador and Peru. Introduced in Florida. (A related species possibly not distinct ranges north in Central America to Mexico.)

OTHER COMMON NAMES.—wild tamarind, stink casha (Virgin Islands); cambrón, aroma, carambomba (Dominican Republic); guatapaná (Cuba); faique, aromo, vilca, guarango (Ecuador); taque, espino (Peru); steel acacia (United States); long-spined acacia (Bahamas); wild tamarind, park-nut (Jamaica); acacia piquant (Martinique); acacia (Haiti); French casha, Creole casha, Spanish casha (Dutch Antilles).

BOTANICAL SYNONYMS.—*Acacia macracanthoides* Bert., *A. lutea* (Mill.) Britton, *Poponax macracantha* (Humb. & Bonpl.) Killip, *P. macracanthoides* (Bert.) Britton & Rose.

355. Tamarindo silvestre, casha *Acacia macracantha* Humb. & Bonpl.

Flowering twig (above), fruit (lower right), natural size.

356. Acacia nudosa, spineless acacia ***Acacia muricata* (L.) Willd.**

This species of acacia, which is more common in the Virgin Islands than Puerto Rico, is distinguished by: (1) the absence of paired spines at leaf bases, as in the other native species of the genus; (2) twice pinnate leaves 6–10 inches long, with 4–6 pairs of secondary axes, each with 6–16 pairs of oblong leaflets ⅜–¾ inch long and ⅛–⅜ inch wide, shiny dark green above and dull whitish green beneath, almost stalkless; (3) white flowers about ¼ inch long stalkless on slender axes 3–6 inches long; and (4) oblong flat pods 3–5 inches long and ½–⅞ inch wide, dark brown, opening on 1 side.

A deciduous small tree 30 feet high and 6 inches in trunk diameter, reported to become larger, with thin crown. The smooth gray bark consists of an outer dead purplish layer and the pinkish, bitter inner bark. The slender spineless twigs are light green and minutely hairy when young, becoming brown, with raised whitish dots (lenticels). The naked buds are composed of minute brown hairy leaves with 2 stipules less than 1/16 inch long.

The alternate bipinnate leaves have a yellow-green axis 2–5 inches long, minutely hairy, with 4–6 pairs of secondary axes each 3–5 inches long, mostly with a cuplike gland on the main axis at base of each pair. The paired leaflets are oblique with midrib near one edge and sides unequal, slightly notched or rounded at apex, unequal and slightly notched at base, with sunken midrib and edges slightly turned under, thin or slightly thickened, and hairless at maturity.

The slender unbranched flower clusters (spikes) are borne near apex of twigs before the new leaves unfold. Along the narrow axis are many stalkless white, slightly fragrant flowers ¼ inch long, spreading in masses more than ½ inch across. The flower is composed of light yellow 5-toothed calyx less than 1/16 inch long; tubular light yellow corolla less than ⅛ inch long, with 5 pointed lobes; many white threadlike spreading stamens about ¼ inch long, united at base; and pistil of minute greenish ovary and white threadlike style.

Usually 1 or 2 flat pods develop along an axis. They have straight edges not narrowed between the seeds, dark brown walls cracked at the surface and slightly thickened, and open widely on 1 side, exposing the inner walls with reddish brown impressions of seeds separated by light yellow bands. Seeds 6–12, elliptic or oblong, ½–⅝ inch long, dark brown, flat and thin. Flowering intermittently through the year, the fruits persistent.

The sapwood is light brown and the heartwood reddish brown. The wood is hard, heavy, strong, and durable.

Locally common in moist forest at 100–1,000 feet altitude, lower foothills in eastern and southeastern Puerto Rico. Also in Vieques, Culebra, St. Thomas, St. John, Tortola, Jost Van Dyke, and Virgin Gorda.

PUBLIC PARK.—Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands and Lesser Antilles from Antigua to Guadeloupe, Iles des Saintes, Dominica, and Martinique. Recorded long ago from Hispaniola (Haiti).

OTHER COMMON NAMES.—tamarindo cimarrón, cajoba (Puerto Rico); amarat (Virgin Islands); ironwood (Antigua); tendre à cailloux, amourette (Martinique).

BOTANICAL SYNONYM.—*Senegalia muricata* (L.) Britton & Rose.

356. Acacia nudosa, spineless acacia *Acacia muricata* (L.) Willd.

Leafy twig (left), flowers and fruits (lower right), two-thirds natural size.

357. Goma arábica, gum arabic ***Acacia nilotica* (L.) Delile***

This species of gum arabic is planted for ornament in Puerto Rico and the Virgin Islands and naturalized locally. It is recognized by: (1) long slender straight light gray spines ½–1½ inches long, paired at base of some or most leaves; (2) bipinnate leaves 2–6 inches long, with 3–8 pairs of side axes, each with 10–30 pairs of narrow oblong leaflets ⅛–¼ inch long and less than 1/16 inch wide; (3) balls of yellow flowers ⅝ inch in diameter; and (4) narrow whitish gray flattened pods 2–6 inches long and 5/16–⅝ inch wide, finely hairy, slightly narrowed between seeds.

Introduced deciduous shrub or spiny tree 10–25 feet high. Twigs gray to dark brown, slender, finely hairy or nearly hairless.

Leaves alternate, bipinnate, with paired spines formed from stipules, the axis finely hairy, with a few dot glands. Lateral axes ½–1½ inches long. Leaflets blunt at both ends, with minute hairs along edges.

Flower heads few at leaf bases or nodes on slender jointed stalks ½–1 inch long. Flowers 5/16 inch long are composed of tubular 5-toothed slightly hairy calyx, narrow yellow tubular 5-toothed corolla ⅛ inch long, many yellow stamens more than ¼ inch long and united at base, with bright yellow dotlike anthers and slender pistil with threadlike style. Pods stalked at base, ending in a short point. Seeds several, rounded but flattened, 5/16 inch in diameter, blackish.

An ornamental in Puerto Rico and Virgin Islands, becoming naturalized locally and forming thickets.

Elsewhere the gum that exudes from the trunk has been used in mucilage, ink, and medicine. The hard wood has been utilized. The pods have served in tanning, and the flowers attract bees.

RANGE.—Native of tropical Africa and Asia. Planted and naturalized in many islands of the West Indies including Puerto Rico and Virgin Islands and Lesser Antilles from Anguilla and St. Barts to Barbados and Tobago. Widespread through the tropics.

OTHER COMMON NAMES.—goma arábica, goma de acacia (Spanish); gum arabic, Amrad gum (English); casha (Anguilla); cassie (Antigua); acacia saline, pompons jaunes (Martinique).

BOTANICAL SYNONYM.—*Acacia arabica* (Lam.) Willd.

357. Goma arábica, gum arabic *Acacia nilotica* (L.) Delile*

Fruiting twig (above), flowering twig (lower left), leafy twig (lower right), natural size.

358. Catechu-tree ***Acacia polyacantha* Willd.***

This Old World tree introduced in St. Croix is characterized by: (1) paired short conic curved spines at base of some leaves; (2) bipinnate leaves 6–9 inches long, with 7–25 pairs of side axes, each with 25–50 pairs of narrow leaflets ⅛–¼ inch long and less than 1/16 inch wide; (3) small flowers ¼ inch long, white to pale yellow, stalkless along axes 2½–4 inches long; and (4) narrow flat gray pods 2½–5 inches long and ⅜–⅝ inch wide.

A deciduous spiny spreading shrub or small tree to 30 feet high, with gray bark. Twigs slender, light gray or whitish, velvety hairy.

Leaves alternate, bipinnate, with paired spines developing some stipules, and with velvety hairy axis bearing a gland below leaflets and at base of some side axes. Leaflets short-pointed at apex, unequal at base, finely hairy or nearly hairless, paler beneath.

Flower clusters (spikes) at leaf bases, slender, finely hairy. Flowers consist of hairy 5-toothed calyx more than 1/16 inch long; tubular 5-toothed hairy corolla ⅛ inch long, white, changing to yellow; many threadlike stamens ¼ long; and pistil with elliptic ovary and threadlike style. Pods pointed at both ends, hairless, hard, with fine network of veins.

The wood is described as hard, heavy, very durable, and polishing well. Catechu or cutch is a resinlike astringent substance obtained by boiling down an extract from the heartwood chips of this and the related species *Acacia catechu* Willd. of the East Indies. This decoction has been used medicinally as an astringent in chronic diarrhea and dysentery, also in tanning and dyeing.

Introduced and naturalized in St. Croix.

RANGE.—Native of tropical Asia and Africa, originally described from India. Planted and naturalized through the tropics. Recorded from Guadeloupe, St. Vincent, and Grenada.

BOTANICAL SYNONYMS.—*Acacia suma* (Roxb.) Kurz, *Senegalia suma* (Roxb.) Britton & Rose.

358. Catechu-tree *Acacia polyacantha* Willd.*

Flowering twig and fruits (lower right), natural size.

359. Casia, twisted acacia ***Acacia tortuosa*** **(L.) Willd.**

A flat-topped spiny shrub of dry forests in the Virgin Islands and eastern Puerto Rico, identified by: (1) slender zigzag twigs with paired straight spines at enlarged nodes; (2) twice pinnate (bipinnate) leaves 1–2 inches long, with 2–8 pairs of side axes, each with 10–20 pairs of minute oblong leaflets 1/8–1/4 inch long; (3) many tiny flowers with threadlike stamens crowded in orange balls 5/16 inch in diameter; and (4) the narrow cylindric blackish pods 3–5 1/2 inches long and 5/16 inch in diameter, not splitting open.

Usually a shrub about 10 feet high, sometimes a tree to 20 feet, with trunk 6 inches in diameter often crooked, deciduous, with very thin flat-topped crown. Bark light gray, finely fissured, the inner bark light brown with darker streaks, slightly bitter. Twigs slender, light green and hairy when young, becoming reddish brown with whitish dots (lenticels). At each node are 2 straight slender sharp spines (stipules) 1/8–1 1/2 inches long.

The leaves are alternate, twice pinnate (bipinnate), and finely hairy, the axis with gland below leaflets. The oblong leaflets are almost stalkless, blunt at apex, dull green on upper surface, and light green beneath.

The numerous stalkless fragrant orange flowers are in heads on stalks about 3/4–1 1/4 inches long, 1 or 2 at base of a leaf. Each flower 1/8 inch long consists of funnel-shaped whitish hairy calyx less than 1/16 inch long, 5-toothed; funnel-shaped light yellow corolla more than 1/16 inch long, 5-toothed; many threadlike orange stamens 1/8 inch long, united into tube in lower half; and greenish pistil with ovary and slender style, often not functional. The pods are slightly narrowed between the several seeds. Flowering intermittently through the year.

The wood is light brown and hard.

Livestock eat the pods. Elsewhere the plants have been grown and pruned as hedges.

Locally abundant on dry coasts and lower slopes in dry forests from sea level to 600 feet altitude, St. Croix, St. Thomas, St. John, Tortola, and perhaps others of Virgin Islands. Also in eastern Puerto Rico, Palominos, and Muertos.

PUBLIC PARKS.—Buck Island Reef, Virgin Islands.

RANGE.—Jamaica, Hispaniola, Puerto Rico and Virgin Islands, Lesser Antilles from St. Barts, St. Eustatius, and Antigua to Martinique. Also northern South America from Aruba, Bonaire, and Curacao and Venezuela to Colombia and Ecuador including Galápagos Islands. Southern Florida, apparently introduced.

OTHER COMMON NAMES.—acacia-bush (Virgin Islands); acacia, carambomba (Dominican Republic); aromo (Colombia); cují, cují torcido (Venezuela); twisted acacia (United States); wild poponax, acacia-bush (Jamaica); akasee, sweet-briar (Barbados); bayahonde rouge (Haiti); wabi, hobada, Dutch casha (Dutch Antilles).

BOTANICAL SYNONYM.—*Poponax tortuosa* (L.) Raf.

Plants of southern Texas, Mexico, and Guatemala known as huisache and included in this species are now referred to a closely related species, *Acacia schaffneri* (S. Wats.) F. J. Hermann.

359. Casia *Acacia tortuosa* (L.) Willd.

Flowering twig (above), fruits (below), natural size.

360. Carbonero ***Albizia carbonaria* Britton***

Carbonero, an uncommon legume introduced in forestry tests, is characterized by: (1) young twigs, foliage, and flower clusters with dense short brownish hairs; (2) leaves twice pinnate (bipinnate), 6–12 inches long, with 7–16 pairs of side axes, each with 10–30 pairs of oblong stalkless leaflets; (3) many flowers in many whitish heads 1 inch or more across the threadlike spreading stamens; and (4) oblong narrow flat brown pods 2½–4 inches long and ⅝–¾ inch wide.

A medium-sized to large planted tree becoming where native 70 feet high and 2 feet in trunk diameter, with flattened spreading thin crown. Bark light gray, scaly. Twigs brown, densely short hairy when young.

Leaves alternate, bipinnate, finely hairy, with axis 4–9 inches long, often with dotlike gland at end, and side axes 2½–4 inches long. Leaflets oblong, 3/16–⅜ inch long and 1/16 inch wide, oblique or unequal at base with midvein not in center, blunt at apex, not toothed on edges, thin, without side veins, the upper surface dull green with minute hairs, and the lower surface paler and soft hairy.

Flower clusters (panicles) shorter than leaves, with finely hairy branches, bearing many heads on stalks up to 1¼ inches long. Flowers on stalks less than 1/16 inch are composed of narrow bell-shaped hairy 5-toothed greenish calyx ⅛ inch long; hairy greenish corolla less than ¼ inch long, with narrow tube and 5 short lobes; many white threadlike stamens ½–⅝ inch long united near base, and slender pistil with narrow ovary and threadlike style. The pod has a stalk about ⅜ inch long at short-pointed base, is rounded and abruptly pointed at apex, thickened at borders, finely hairy. Seeds 15–25, oblong, ⅛ inch long, gray.

The wood is light brown and soft, reported to be suitable for lumber.

Tested in forest plantations in Puerto Rico. Common at a finca above Coamo. Of very rapid growth but short-lived and with fragile branches. In Colombia the trees have served for shade in coffee plantations.

RANGE.—El Salvador, Panama, and Colombia.

This species was named by N. L. Britton in 1926 from trees planted by the Forest Service in 1921 from seed obtained from Palmira, Colombia, the year before.

OTHER COMMON NAMES.—carbonero blanco, carbonero de sombría, pisquin, muche blanco, guamuche, dormilón, bayeto antioqueño (Colombia), gallinazo (Venezuela).

BOTANICAL SYNONYM.—*Albizia malacocarpa* Standl.

360. Carbonero

Albizia carbonaria Britton*

Flowering twig and fruit (lower right), natural size.

361. Cojobillo, white calliandra ***Calliandra caracasana*** **(Jacq.) Benth.**

This spineless shrub seldom more than 10 feet high rarely becomes a small tree. It is characterized by: (1) twice pinnate (bipinnate) leaves 3–7 inches long with 2–6 pairs of side axes each with 10–30 pairs of crowded narrow leaflets ⅜–⅝ inch long and 1/16–⅛ inch wide; (2) many showy white flowers crowded in heads 1–1¼ inches or more across the numerous threadlike stamens; and (3) narrow flat pods 2–4 inches long, the hard stiff walls splitting open from the apex and curving back spirally.

A deciduous shrub or rarely a small tree to 20 feet or more in height and 3 inches in trunk diameter, with twigs and foliage hairless or slightly hairy.

Leaves alternate, bipinnate, with paired pointed stipules 3/16 inch long, the slender axis without glands. Leaflets stalkless, narrow, straight or slightly curved, blunt at both ends, thin, with few veins, light green, paler beneath.

The heads with about 15 flowers are 1–3 at leaf bases on stalks 1¼–4 inches long. Each flower is composed of 5-toothed calyx about 1/16 inch long; tubular 5-lobed whitish corolla more than ⅛ inch long; many long threadlike white stamens ⅝–1 inch long, united into tube toward base; and pistil with narrow ovary and slender style. The hard pods are ¼–⅜ inch wide, blunt or rounded at apex, narrowed to base, raised at margins, hairless or nearly so, splitting elastically from apex. Seeds several oblong, flat, brown, 3/16 inch long.

Scattered in dry and moist forest at lower and middle altitudes in Puerto Rico. Also in Vieques, Culebra, St. Thomas, St. John, and Tortola.

PUBLIC PARK.—Virgin Islands.

RANGE.—Bahamas, Greater Antilles, Virgin Islands, and Grenada. Also from southern Mexico and British Honduras to Venezuela, Brazil, Peru, and Ecuador.

OTHER COMMON NAMES.—moriviví cimarrón, zarza boba, acacia puertorigueña (Puerto Rico); granolino (Dominican Republic); tamarindo de monte (Guatemala); guacamaya montés, pelo de vieja (El Salvador); riverain shrub (British Honduras); night-flowering acacia (Jamaica).

BOTANICAL SYNONYMS.—*Calliandra portoricensis* (Jacq.) Benth., *Anneslia portoricensis* (Jacq.) Donn. Smith, *A. caracasana* (Jacq.) Britton & Rose.

362. Surinam calliandra ***Calliandra surinamensis*** **Benth.***

This planted ornamental shrub or small tree with flowers suggesting a pinkish paint brush becomes 10–20 feet high, spreading, irregular, and very open, with several light gray stems to 6 inches in diameter ending in long arching branches. Further identified by: (1) leaves alternate on short side twigs, bipinnate, 1–3 inches long, with slender petiole ¼–⅝ inch long, and 1–3 pairs of slender axes 1–2½ inches long, each with 7–10 pairs of narrowly oblong yellow-green leaflets ¼–⅝ inch long and less than ⅛ inch wide, blunt and unequal at both ends, almost hairless; (2) showy flower heads nearly 2 inches long and broad, composed of many narrow stalkless fragrant flowers with yellow-green 5-toothed calyx, yellow-green 5-toothed corolla ⅜ inch long, and very narrow funnel-shaped white stamen tube ¾–1¼ inches long ending in many spreading pink to purple threadlike stamens, and mostly without pistil; and (3) pods single, to 4 inches long and ½ inch wide, flat with raised border, splitting open from apex into 2 stiff curved parts. Flowering irregularly through the year and propagated by seed. RANGE.—Native of northern South America. OTHER COMMON NAME.—canasta mexicana (Dominican Republic).

361. Cojobillo, white calliandra *Calliandra caracasana* (Jacq.) Benth.

Natural size.

363. Guanacaste, earpod-tree ***Enterolobium cyclocarpum*** **(Jacq.) Griseb.***

Guanacaste, a handsome giant tree with very stout short trunk and broadly spreading crown, is sometimes planted for shade and ornament. It is characterized by: (1) bipinnate leaves 6–10 inches long with 4–9 pairs of secondary axes, each with 20–30 pairs of oblong leaflets ⅜–½ inch long and ⅛–3/16 inch wide; (2) many flowers in a whitish ball about 1 inch across the numerous spreading stamens; and (3) the very distinctive blackish seed pod, flattened and curved in a complete circle or disk 3½–4¼ inches in diameter, slightly resembling a human ear.

In its native home this large to very large deciduous tree attains a height of 60–100 feet. It has a stout short trunk 3–6 feet or more in diameter, large almost horizontal branches, and a thin spreading crown broader than the height and as much as 75–150 feet in diameter. Most trees planted in Puerto Rico are smaller, less than 50 feet high and 3 feet in trunk diameter, not old enough to reach maximum size. However, a giant in Mayaguez is about 90 feet tall and 10 feet in diameter. The bark is gray or brownish gray, slightly rough or scaly with shallow furrows. Inner bark is light brown, bitter, and astringent, and exudes a brownish gum. The stout twigs are green when young and later brownish gray.

The alternate twice pinnate (bipinnate) leaves have a light green axis, finely hairy, with a small gland below the lowest secondary axes and another near the apex. The stalkless leaflets are short-pointed at apex, squarish and unequal at the base with the midvein near a side, thin, finely hairy, the upper surface dull green and the lower surface pale green.

Flower clusters like balls (heads) are borne on stalks at the base of leaves or when leafless. The crowded flowers are tubular or funnel-shaped, about ½ inch long and ⅜ inch across the stamens. The calyx is tubular, ⅛ inch long, light green, and 5-toothed; the corolla tubular, ¼ inch long, light green, and 5-toothed; numerous whitish stamens to ⅜ inch long, threadlike, united into tube in lower half; and pistil ½ inch long with short light green ovary and slender white style.

The heavy pod is curved in a circle around the central space or hole of ⅜ inch and suggests slightly the form of the human ear. The color changes from shiny green when immature to blackish or dark brown. It is flat but thicker around the seeds and does not open. There are several dark brown elliptic seeds ½–¾ inch long.

The sapwood is whitish and the heartwood brown, similar to walnut, often reddish tinged. The wood is lightweight (specific gravity 0.4–0.6), hard, and has many large pores. It is moderately durable and resistant to attack by dry-wood termites. It polishes well and does not split or twist when exposed. The wood is used for construction, carpentry, interiors, furniture, and veneer. Indians made dugout canoes from large trunks.

In the savannas where native, these large trees serve well as shade for livestock, which eat the pods and foliage. Also, the trees are planted for shade along highways. It is reported that the toasted seeds are edible. The bark and pods are rich in tannin. The gum from the bark can substitute for gum arabic. It is said that sawdust is irritating to some workmen and also can kill fish if dumped into rivers.

Sometimes planted for shade and ornament in Puerto Rico but uncommon and not now recommended. A fungus disease causes the trees to fall suddenly. Of rapid growth.

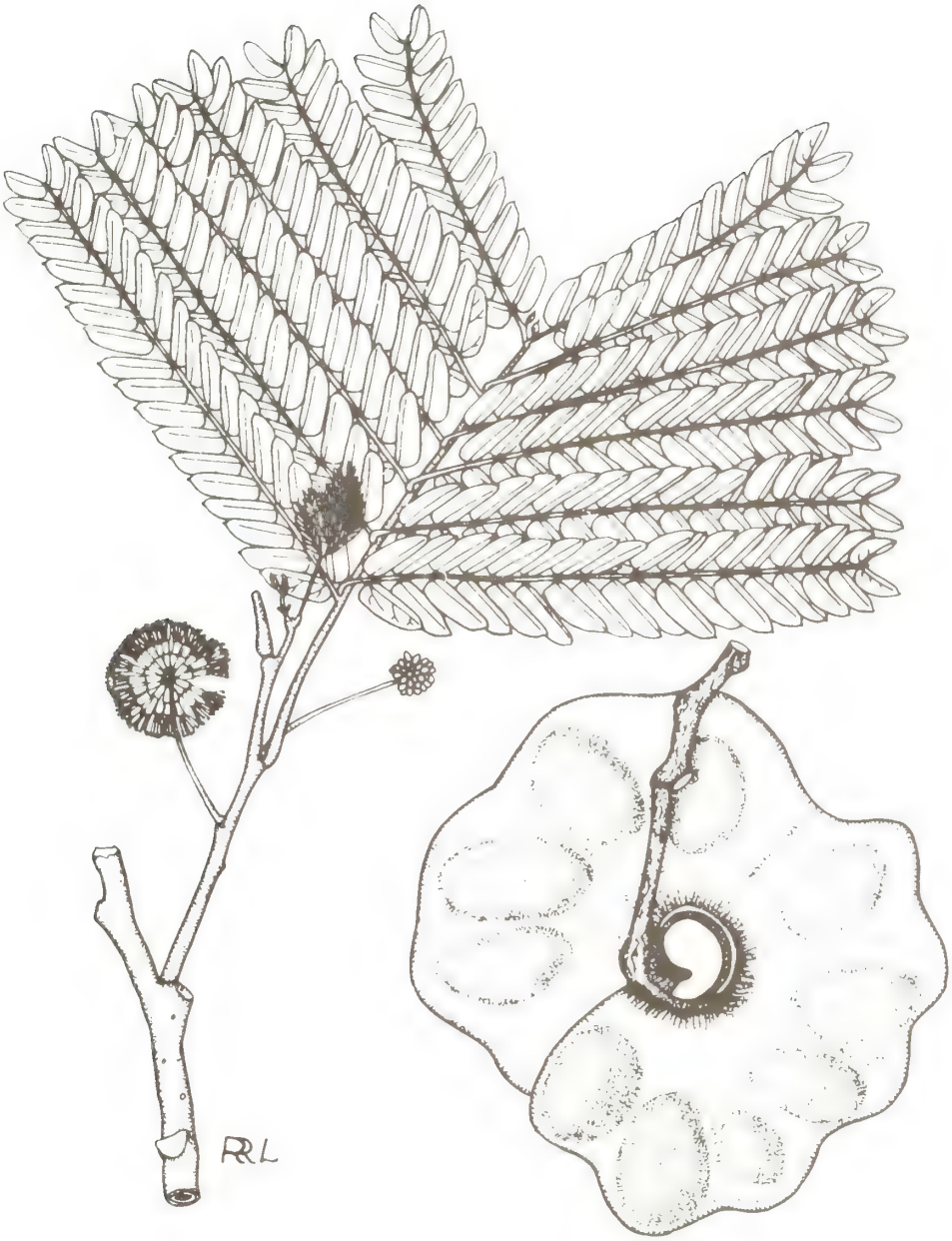
Recommended in south Florida as a very large spreading shade tree for parks, playgrounds, and other areas with ample space for the broad root system. The large branches are subject to storm damage.

PUBLIC FOREST.—Cambalache.

RANGE.—Mexico and British Honduras south through Central America to Venezuela, Trinidad, Guyana, and Brazil. Introduced as a shade tree in West Indies and other tropical regions.

OTHER COMMON NAMES.—dormilón, oreja de mono (Puerto Rico); oreja, flamboyán extranjero (Dominican Republic); árbol de las orejas, orejón, algarrobo de orejas (Cuba); orejón, parota, nacazle (Mexico); guanacaste, conacaste (Central America); caro hembra, árbol de orejas (El Salvador); guanacaste de oreja, guanacaste blanco, genicero, tuburus (Nicaragua); genicero, jarina (Costa Rica); corotú, ear-tree (Panama); caro, piñón, piñón de oreja, carito, orejero, dormilón (Colombia); caro, carocaro, caracara, hueso de pescado (Venezuela); tubroos, guanacaste (British Honduras); earpodtree, eartree (United States); elephant-ear, monkey-soap (Jamaica); devilsear (Trinidad, Barbados); bois tanniste rouge (Haiti).

The Spanish common name guanacaste is from a word of the Nahuatl language of the Aztecs meaning ear-tree. This large tree is sufficiently common and characteristic to have given its name to the Province of Guanacaste in northwestern Costa Rica. Likewise, oreja means ear.



63. Guanacaste, earpod-tree *Enterolobium cyclocarpum* (Jacq.) Griseb.*

Flowering twig (above), fruit (lower right), two-thirds natural size.

364. Guaba venezolana *Inga fastuosa* (Jacq.) Willd.*

Guaba venezolana, which has been introduced from Venezuela for coffee shade, is easily distinguished from the native species of guaba by the much larger leaves, flowers, and pods, also the long bristly reddish hairs on twigs and pods. Further identified by: (1) pinnately compound leaves with 3 (sometimes 4 or 5) pairs of large ovate or elliptic, shiny thick hairy leaflets and broadly winged axis; (2) several large greenish white flowers stalkless along an axis with many threadlike stamens 3–3½ inches long; and (3) giant brown pods 12–16 inches long and 2½ inches wide, flat but thick.

An evergreen planted tree becoming 30 feet high, with short branching trunk 6 inches or more in diameter, and spreading crown. The bark is brown, smoothish or with many small fissures, becoming scaly. Inner bark is light brown and hard. The stout brown twigs are covered with bristly hairs.

The alternate pinnate leaves 6–12 inches long have paired large narrow hairy scales (stipules) at base and brown densely bristly hairy axis 3–6 inches long with wings ¼–½ inch wide. Leaflets paired, almost stalkless, with gland between each pair, 1½–7 inches long and 1–3½ inches wide, the lowest smallest, with short or narrow point at apex, rounded or slightly notched at base, not toothed on edges, slightly thickened, the upper surface slightly shiny dark green and becoming nearly hairless except on the slightly sunken veins, and the lower surface green and bristly hairy, with raised side veins.

Flower clusters (spikes) about 6 inches long are borne at leaf bases. Flowers few, soon falling, composed of narrow cylindric greenish calyx ¾–1 inch long, bristly hairy and 5-toothed; narrow cylindric tubular corolla 1¾–2 inches long with 5 narrow lobes, pale greenish, covered with long hairs on outside; many threadlike stamens 3–3½ inches long and spreading 2–3 inches across, united in tube in lower half, changing color from white to orange; and very narrow pistil with threadlike style longer than stamens. The pods are covered with bristly reddish brown hairs and twist upon splitting open. There are several large flattened seeds. Flowering and fruiting in summer.

The wood is light brown and hard.

This rapidly growing species has been introduced into Puerto Rico for coffee shade. The pulp surrounding the seeds in the pods is reported to be sweet and edible.

Uncommon as a planted shade tree in coffee plantations in Central Cordillera of Puerto Rico. Introduced in 1929.

RANGE.—Native of Colombia and Venezuela. Introduced elsewhere in tropical America.

OTHER COMMON NAMES.—guaba peluda (Puerto Rico); guama venezolana (Dominican Republic); guamo cajeto (Colombia); guamo, guamo peludo (Venezuela).

64. Guaba venezolana

Inga fastuosa (Jacq.) Willd.*

Flowering twig, two-thirds natural size.

365. Uña de gato, bread-and-cheese, catclaw ***Pithecellobium unguis-cati*** **(L.) Mart.**

Uña de gato, a shrub or small tree of coastal thickets, is recognized by: (1) paired slender sharp brown or gray spines 1/8–1/2 inch long, sometimes longer, often developing at nodes; (2) twice pinnate (bipinnate) leaves with slender axis and 2 forks, each with 2 almost stalkless oblique oblong to obovate leaflets; (3) small light yellow or pinkish flowers in many ball-like heads about 3/4 inch across, on long slender branching stalks at leaf bases; and (4) curved or coiled reddish to dark brown pods 2–5 inches long, flattened, and splitting open on both sides.

Spiny shrub less than 10 feet high or small tree to 30 feet tall with several trunks to 5 inches in diameter, and widely spreading thin crown, hairless. Nearly evergreen or without leaves for short periods. The bark is gray and smooth or slightly fissured, with horizontal lines and few paired spines to 1/2 inch long persisting at old nodes. The inner bark is light brown and slightly bitter. The twigs are brownish gray, angled, with dots (lenticels), often zigzag and with paired spines (stipules).

The alternate hairless leaves 1–3 inches long have a very slender petiole 1/2–1 1/2 inches long, with a minute green dot gland at apex, and 2 lateral axes (pinnae) 1/8–1/2 inch long. The 4 leaflets are 1/2–2 inches long and 3/8–1 inch wide, rounded at apex, oblique and short-pointed at base, not toothed on edges, thin or slightly thickened, dull green with raised veins above, and lighter blue green beneath.

Flower clusters (heads) contain 10–20 stalkless hairless flowers. Each has a tubular 5-toothed calyx 1/16 inch long, tubular 5-lobed corolla about 3/16 inch long, many spreading long threadlike light yellow stamens 1/2 inch long united into a pinkish tube at base, and pistil with narrow stalked ovary and long threadlike style.

The curved twisted pods coiled into a circle are 1/4–1/2 inch wide, slightly narrowed between the seeds, red on inner surface. Several shiny black rounded and flattened seeds 3/8 inch long hang down from reddish or white pulp (aril). With flowers and fruits irregularly through the year.

The wood is light brown, hard, and heavy.

Common locally in coastal forests and hills from sea level to 600 feet altitude, along the southwestern and southern coasts of Puerto Rico and extending up the valley of the Coamo River. Forming thickets on sandy shores and dry coastal areas. Also, widespread throughout the smaller islands, including Mona, Desecheo, Muertos, Isla Piñeros, Vieques, Culebra, St. Croix and Buck Island Reef, St. Thomas, St. John, Jost Van Dyke, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Aguirre, Boquerón, Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Southern Florida including Florida Keys and through West Indies to Trinidad and Tobago, also Bonaire, Curacao, and Aruba. Also in Mexico and Venezuela and Guyana.

OTHER COMMON NAMES.—rolón escambrón colorado (Puerto Rico); blackbead, crab-prickle (Virgin Islands); uña de gato (Dominican Republic, Cuba); güichere (Venezuela); catclaw blackbead, blackbead, catclaw, Florida catclaw, catclaw apes-earring (United States); blackbead (Jamaica); bread-and-cheese, black jessie (Trinidad); bread-and-cheese, mangrove bead-tree (Barbados); diaballe (Martinique); crab-wood, uña di gatu, beshi di juana (Dutch Antilles); beefsteak (The Grenadines).

365. Uña de gato, catclaw *Pithecellobium unguis-cati* (L.) Benth.

Flowering twig (above), fruiting twig (lower right), natural size.

CASSIA SUBFAMILY (CAESALPINIOIDEAE; CAESALPINIACEAE)

Trees, shrubs, and herbs, mostly tropical, known by: (1) leaves pinnate or bipinnate, sometimes of 2 leaflets or simple; (2) flowers only slightly irregular; (3) petals 5 slightly unequal, separate, overlapping in bud, the largest petal innermost in bud; and (4) stamens mostly 10 or fewer, separate or united. Also, vol. 1, p. 168.

Key to species

A. Leaves simple and 2-lobed or of 2 leaflets.
  B. Leaves simple, 2-lobed—*Bauhinia.*
    C. Leaves divided about ⅓ their length into 2 rounded lobes, base nearly straight or slightly notched; petals pink, dotted with red—71. Mariposa, butterfly bauhinia, *Bauhinia monandra* Kurz.*
    CC. Leaves deeply divided, base deeply notched or heart-shaped; petals purplish.
      D. Leaves divided to about middle, petals purple and white mottled, more than 1 inch wide—367. *Bauhinia variegata.**
      DD. Leaves deeply divided, petals pink to purple, less than ½ inch wide—366. *Bauhinia purpurea.**
  BB. Leaves of 2 leaflets.
    E. Leaflets ⅝–1¼ inches long, blunt or slightly notched at apex—375. *Cynometra portoricensis.*
    EE. Leaflets 2–4 inches long, long- or short-pointed at apex—76. Algarrobo, West-Indian-locust, courbaril, *Hymenaea courbaril* L.
AA. Leaves compound, of several to many paired leaflets.
  F. Leaves once pinnate.
    G. Leaflets 2–4 pairs, widest near notched apex and tapering to base (obovate); twigs often with spines —376. *Haematoxylum campechianum.**
    GG. Leaflets mostly more numerous, widest toward base or near middle; twigs not spiny.
      H. Leaflets oblique at base and slightly unequal or asymmetrical, oblong, 10–18 pairs—80. Tamarindo, tamarind, *Tamarindus indica* L.*
      HH. Leaflets equal and symmetrical at base.
        I. Leaflets with scattered raised black dots on lower surface and with short red stalks 1/16 inch long—79. Cóbana negra, *Stahlia monosperma* (Tul.) Urban.
        II. Leaflets without black dots, with greenish stalks—*Cassia.*
          J. Flowers pink or reddish; leaflets oblong; pods cylindrical, not splitting open.
            K. Petals more than 1 inch long; leaflets mostly 8–10 (5–15) pairs, mostly short-pointed at apex and blunt-pointed at base; pods 16–20 inches long and ⅝ inch in diameter—73. Casia rosada, pink cassia, *Cassia javanica* L.*
            KK. Petals about ½ inch long; leaflets 20–40 pairs, mostly rounded at both ends with minute point at apex; pods 15–20 inches long and 1¼ inches in diameter—371. *Cassia grandis.**
          JJ. Flowers yellow.
            L. Leaves crowded at nodes; leaflets 5–15 pairs, very small, mostly ¼ inch long, elliptic, with 3 main veins; pods flattened, 3½–6 inches long, splitting open—373. *Cassia polyphylla.*
            LL. Leaves not crowded, leaflets larger, with 1 main vein.
              M. Leaflets ovate, short-pointed at apex; pods cylindrical, mostly not splitting open.
                N. Leaflets 4–8 pairs, 3–6 inches long; pods 15–24 inches long, ¾ inch in diameter—72. Cañafístula, golden-shower, *Cassia fistula* L.*
                NN. Leaflets 12–30 pairs, 1½–2½ inches long; pods 8–12 inches long and ⅜–½ inch in diameter, sometimes splitting open—374. *Cassia spectabilis.**
              MM. Leaflets mostly oblong and rounded at both ends; pods flattened, splitting open.
                O. Leaflets 6–11 pairs, 1¼–3 inches long; pods 6–10 inches long—74. Casia de Siam, Siamese cassia, *Cassia siamea* Lam.*
                OO. Leaflets 2–5 pairs.
                  P. Leaflets ⅝–1¼ inches long; pods 3 inches long—372. *Cassia planisiliqua.**
                  PP. Leaflets 1–2½ inches long; pods to 12 inches long—370. *Cassia emarginata.*
  FF. Leaves bipinnate.
    Q. Leaves consisting of a spine and 1 or 2 pairs of drooping yellow-green strips (lateral axes) ⅛ inch broad bearing numerous small leaflets ⅛–3/16 inch long, which shed early—77. Palo de rayo, Jerusalem-thorn, *Parkinsonia aculeata* L.*
    QQ. Leaves regularly branched, not spiny, with several to many pairs of lateral axes (pinnae), each with many leaflets and featherlike.
      R. Lateral axes (pinnae) 3–10 pairs.
        S. Leaflets 12–28 pairs, narrowly oblong, about ¼ inch long—368. *Caesalpinia coriaria.*
        SS. Leaflets 5–12 pairs, oblong, ⅜–⅝ inch long—369. *Caesalpinia pulcherrima.**
      RR. Lateral axes (pinnae) 10–30 pairs.
        T. Leaflets less than ⅜ inch long; young twigs and leaf axes greenish, finely hairy—75. Flamboyán, flamboyant-tree, *Delonix regia* (Bojer) Raf.*
        TT. Leaflets ½–¾ inch long; young twigs and leaf axes with dense coat of reddish-brown hairs —78. Flamboyán amarillo, yellow flamboyant, *Peltophorum inerme* (Roxb.) Naves.*

366. Palo de orquídeas, purple bauhinia ***Bauhinia purpurea* L.***

This showy ornamental small tree with orchidlike flowers is recognized by: (1) the squarish or elliptic leaves divided more than ⅓ their length into 2 rounded lobes with 13 or 11 radiating main veins from the heart-shaped base; (2) the large showy flowers 3½–4 inches across, with 5 slender-stalked narrow purple or pink petals (1 petal dark red toward base); and (3) the flat blackish pods 8–12 inches long and ¾–1 inch wide, which twist as they open. From related species distinguished by the flowers with narrow petals less than ⅝ inch wide, calyx splitting into 2 nearly equal parts, and the 3 (sometimes 4) fertile stamens and by the deeply lobed leaves.

An evergreen small planted tree 25 feet high and 7 inches in trunk diameter or larger. The bark is light gray, smoothish to finely fissured. Twigs are light green, finely hairy, often slightly zigzag, becoming light brown.

The leaves are alternate in 2 rows, hairless, with petioles 1–2 inches long, light green, slender, enlarged at both ends. Leaf blades are 1½–5 inches long and broad, slightly thickened, turned up at middle, the upper surface dull light green with veins slightly sunken, and the lower surace paler with raised veins.

Unbranched flower clusters (racemes) at ends of twigs bear few slightly fragrant flowers on hairy greenish stalks ¼–½ inch long. The narrow finely hairy light green basal tube (hypanthium) about ½ inch long and closed at apex bears the other parts; the 5-angled calyx 1 inch long in bud, greenish with minute reddish brown hairs, splits into 2 parts and turns down; the 5 nearly equal petals are about 2 inches long and less than ⅝ inch wide, blunt at apex and tapering to stalk at base; 3 (sometimes 4) curved purplish stamens 1½–1¾ inches long and 7–6 threadlike sterile stamens (staminodes) ¼ inch long; and the stalked very slender pistil 1½ inches or more in length with greenish 1-celled ovary, long curved style, and enlarged rounded stigma. There are several rounded flat seeds ½–⅝ inch long, shiny brown. Flowering and fruiting in autumn and winter months.

This ornamental is widespread but uncommon in moist parts of Puerto Rico, such as in gardens and along roadsides, and the Virgin Islands. It seldom escapes from cultivation. Grown also in Florida and elsewhere in tropical America. In central and south Florida this is one of the most common introduced trees with orchidlike flowers. It is recommended as a small flowering tree for yards. Of medium growth on well drained soils.

PUBLIC FOREST.—Luquillo.

RANGE.—Native of southeastern Asia from India to China.

OTHER COMMON NAMES.—pie de cabra (Guatemala); ramo de orquídea, pata de vaca (Venezuela); orchidtree (English).

BOTANICAL SYNONYMS.—*Phanera purpurea* (L.) Benth., *Caspareopsis purpurea* (L.) Pittier.

366. Palo de orquídeas, purple bauhinia *Bauhinia purpurea* L.*

Flowering twig (left), fruit (right), natural size.

367. Palo de orquídeas, poor-man's-orchid ***Bauhinia variegata*** **L.***

This ornamental small tree with flowers slightly suggesting an orchid is identified by: (1) the odd rounded leaves divided less than ¼ their length into 2 rounded lobes with 11 or 9 main veins from the heart-shaped base; (2) large showy variegated orchidlike fragrant flowers 3½–4 inches across, with 5 slender-stalked purplish petals (white in a variety), 1 darker streaked; and (3) flat dark brown pods 5–9 inches long, about ¾ inch wide, and only 1/16 inch thick, long-pointed at both ends. Separated from related species by the flowers with broad petals more than 1 inch wide, calyx splitting open on 1 side, and the 5 stamens, also the shallowly lobed leaves.

Small tree 25 feet high and 8 inches in trunk diameter, evergreen or deciduous. The bark is light brownish gray, smoothish to slightly fissured and scaly. Inner bark is pinkish, fibrous, and bitter. The twigs are slender, zigzag, when young light green, slightly hairy, and angled, becoming brownish gray. The bud is composed of minute hairy leaves and stipules.

The alternate leaves spread in 2 rows along the twigs. Stipules are paired, tiny, and hairy. The slender light green petioles are mostly 1–1¼ inches long, enlarged at both ends, finely hairy. Blades are slightly broader than long, mostly 2½–4½ inches long and 2¾–5 inches wide, thin, not toothed on edges. The upper surface is dull light green and hairless, slightly turned up at middle, the lower surface lighter green and often finely hairy on veins.

Flower clusters (racemes) are unbranched at ends of twigs. The few flowers have short stout stalks ⅛–¼ inch long and a stalklike light green narrow basal tube (hypanthium) about 1 inch long. The light green finely hairy calyx 1–1½ inches long forms a pointed 5-angled bud and splits open on 1 side, remaining attached; petals 5, 2–2½ inches long and 1–1¼ inches wide, slightly unequal, wavy margined and narrowed to base; 5 curved stamens 1–1½ inches long; and the stalked very slender curved pistil nearly 2 inches long, with narrow green 1-celled ovary, style, and dotlike stigma.

The pods have a stalk about ⅞ inch long beyond the persistent calyx at base of flower. They split open in 2 parts and become curved and twisted. There are several rounded flat light brown seeds about ½ inch in diameter. Flowering from autumn to spring and maturing fruits in late spring and early summer.

The wood is whitish and soft.

This and related species are uncommon as planted ornamentals in residential areas throughout Puerto Rico. Widespread and escaping in southern foothills. Also in the larger Virgin Islands and elsewhere through the tropics. Common as an orchidtree in southern Florida. A variety often grown (var. *candida* Buch.-Ham.) has white flowers.

RANGE.—Native from India to China.

OTHER COMMON NAMES.—flamboyán orquídea (Dominican Republic); patabuey (Colombia); Buddhist bauhinia, orchidtree, mountain-ebony (English).

BOTANICAL SYNONYM.—*Phanera variegata* (L.) Benth.

367. Palo de orquídeas, poor-man's-orchid *Bauhinia variegata* L.*

Natural size.

368. Dividivi *Caesalpinia coriaria* (Jacq.) Willd.

Dividivi, which is rare in St. Thomas, is known commercially for its pods rich in tannin. Distinguishing characters are: (1) bipinnate leaves 2–6 inches long, with many minute narrow dull green leaflets 1/8–1/4 inch long and less than 1/16 inch wide, often with black gland dots beneath; (2) light yellow or whitish flowers 1/4 inch long and broad, with 5 petals, several in short lateral clusters; and (3) the brown pods very curved or twisted, 1 1/4–2 1/4 inches long, 5/8–1 inch wide, and 1/8 inch thick.

Small deciduous tree 25 feet high and 1 foot in trunk diameter, elsewhere larger, the trunk frequently short and branched near base into crooked forks. The crown is irregular, spreading, and thin, often flattened above. Bark light brown or gray, rough and furrowed, forming thick scaly plates. The dry outer bark is light brown and the inner bark pink and bitter. The twigs are gray or brown, hairless or finely hairy, slightly zigzag, with light brown dots (lenticels).

The alternate twice pinnate (bipinnate) leaves have a light green finely hairy axis. Secondary axes 9–17, mostly paired except at end, each commonly with 16–24 pairs of minute almost stalkless leaflets. The thin blades are rounded at both ends, hairless or nearly so, pale green beneath.

Flower clusters (racemes and panicles) 3/4–2 1/4 inches long at leaf bases bear several fragrant flowers. The flower is composed of a basal tube (hypanthium) 1/8 inch long; calyx of 5 yellow-green oblong sepals 1/8 inch long, turned back; corolla of 5 elliptic petals more than 1/8 inch long, light yellow or whitish; 10 stamens less than 1/4 inch long, with hairy green filaments and brown anthers; and pistil more than 1/4 inch long with yellow-green ovary and slender style. The thick hard pods, light brown turning reddish brown, are often concave and curved in circular form or letter S and do not open. The few seeds are 1/4 inch long. Collected with flowers and fruits in July, the fruits persisting.

The thick sapwood is whitish or yellowish and the heartwood dark brown or blackish and often streaked. The wood is very heavy (specific gravity 1.20), very hard, strong, and durable. It polishes well and is suitable for turning but is difficult to work. Reportedly, the wood yields a reddish dye.

Dividivi is important in commerce for its bitter pods which contain 30–40 percent tannin and serve in tanning leather. It is said that a mature tree can produce as much as 80 pounds of pods annually. The pods have been exported from continental tropical America to the United States and Europe. In various places the trees are protected and almost cultivated for the harvests of the pods. The bark is high in tannin also. A black dye has been prepared from the pods. Elsewhere the astringent pods and seeds have served in home remedies. The flowers attract bees.

This species is rare in the seasonal forest on the coastal hills of St. Thomas and can be seen at the east end of the island. One tree was reported long ago from Boquerón, Puerto Rico. Rare as introduced in St. Croix and Puerto Rico as ornamentals also.

RANGE.—Greater Antilles, St. Thomas, and Lesser Antilles to Montserrat, Grenada, and Dutch Antilles (Aruba, Bonaire, Curacao). Also from Mexico to Colombia and Venezuela. Introduced in the Bahamas and other islands and naturalized in Trinidad. Planted in tropical regions of the world.

OTHER COMMON NAMES.—dividive, guatapaná (Puerto Rico); dividive, dividivi (Spanish, commerce); guatapaná (Dominican Republic); guaracabuya (Cuba); cascalote (Mexico); nacascol, nacascolo, nacascolote (Central America); tinaco (El Salvador); agallo (Panama); libidibi, baranó, baranoa (Colombia); guatapán, guatapanare (Venezuela); dividivi (Jamaica, Trinidad); libidibi (Jamaica); dividivi (Haiti); dividivi, watapana (Dutch Antilles).

BOTANICAL SYNONYM.—*Libidibia coriaria* (Jacq.) Schlecht.

368. Dividivi *Caesalpinia coriaria* (Jacq.) Willd.

Flowering twig (above), fruits (lower right), two-thirds natural size.

369. Clavellina, flowerfence *Caesalpinia pulcherrima* (L.) Sw.*

Clavellina, or flowerfence, is widely planted as an ornamental shrub or small tree, escaping from cultivation. It is characterized by: (1) twice pinnate (bipinnate) leaves 6–12 inches long, with many paired oblong leaflets ½–1 inch long and ¼–⅜ inch wide; (2) many large brilliant yellow or orange-red flowers with 5 slightly unequal petals 1½ inches across and with 10 threadlike stamens 1½–2½ inches long, on slender stalks in long erect clusters, and (3) flat blackish or dark brown pods 3–4½ inches long and ½–¾ inch wide, twisting open.

An evergreen prickly shrub or small tree 10–15 feet high, with branching trunks 2–3 inches in diameter and thin flat-topped spreading crown, hairless throughout. Bark light gray, smoothish to slightly fissured. Branches with scattered spines to ¼ inch long, with enlarged base and narrow sharp point.

The alternate bipinnate leaves have stout petiole and slender yellow-green axis together 5–10 inches long. There are 5–10 paired lateral axes (pinnae), each bearing 5–12 pairs of leaflets with stalks less than 1/16 inch long. Leaflets are rounded at apex and often with slight notch and minute point, blunt and unequal at base, not toothed on edges, with side veins inconspicuous, dull green above, and light green beneath.

Many slightly fragrant flowers are borne on greenish stalks of 1–3 inches along the unbranched erect axis (raceme). The axis continues to elongate to 5–10 inches, bearing new buds and flowers in the top 3 inches, while older flowers including their stalks have shed promptly. The short conic green base (hypanthium) 3/16 inch long bears the calyx, corolla, and stamens; there are 4 oblong yellow or orange-red sepals ⅜ inch long and 1 large keeled and concave ⅝ inch long covering others in the yellow or orange-red bud; 5 unequal stalked petals ¾–1 inch long, rounded and finely wavy, yellow or orange red with yellow border (sometimes reddish purple); and 10 threadlike yellow or red stamens 1½–2½ inches long. The pistil more than 2 inches long consists of a very narrow 1-celled ovary on a short stalk, a long threadlike yellow or red style, and dot stigma.

Pods, 1 or 2 formed from a flowering axis, are narrowed into stalk ⅛ inch long above base of flower and have a narrow point ⅛ inch long at apex, slightly oblique and broadest near apex. There are 5–8 shiny brown flat beanlike seeds about ⅜ inch long. Flowering and fruiting through the year.

The flowers, leaves, bark, and roots have been used in home remedies.

A common ornamental in Puerto Rico and smaller islands and through the Virgin Islands and escaping from cultivation along roadsides and in thickets. Planted and naturalized also in southern Florida, southern Texas, southern Arizona, and through the tropics of both hemispheres.

In south Florida recommended as a large shrub to brighten the landscape, also as a screen or unclipped hedge. It is easily propagated and fast growing, even on poor soils, but short lived. In northern Florida where killed back by frosts, this species can be grown as a herbaceous perennial.

PUBLIC FOREST.—Guánica.

RANGE.—Original range unknown, perhaps Mexico and Central America, the type locality India.

OTHER COMMON NAMES.—clavelina (Puerto Rico); dwarf poinciana (Tortola); clavellina (Spanish); carzazo (Dominican Republic); guacamaya (Cuba, Central America); tabachín, flor de camarón, maravilla (Mexico); flor barbona (El Salvador, Guatemala); barbón (El Salvador); barbona roja (Nicaragua); hojasén, gallito (Central America); angelito (Colombia); clavellina colorado (Venezuela); angel sisal (Peru); flowerfence, Barbados-pride, bird-of-paradise flower (English); flowerfence poinciana, Barbados-flower, dwarf poinciana, Barbados flowerfence (United States); Spanish-carnations (Jamaica, Barbados); flambeau-flower (British Honduras); francillade (Haiti); maravilha, barba de barata (Brazil).

BOTANICAL SYNONYM.—*Poinciana pulcherrima* L.

369. Clavellina, flowerfence *Caesalpinia pulcherrima* (L.) Sw.*

Flowers (above), leaf (below), fruits (lower right), two-thirds natural size.

370. Velamuerto ***Cassia emarginata* L.**

This rare shrub or small tree is identified by: (1) pinnate leaves with 2–5 pairs of elliptic leaflets mostly 1–2½ inches long and ¾–1½ inches wide, rounded at both ends, soft hairy beneath; (2) abundant showy flowers about ¾ inch across the 5 elliptic unequal yellow petals; and (3) long straight narrow blackish pods 6–12 inches long and ⅜–½ inch wide, flattened and not splitting open.

Deciduous shrub 10 feet high or a small tree to 20 feet and 5 inches in trunk diameter, elsewhere reported to reach 50 feet in height, with stout branches. Bark light gray. Twigs densely hairy when young. Buds 3/16 inch long formed by the hairy stipules.

The alternate pinnate leaves 4–8 inches long have bristlelike hairy paired stipules ⅛ inch long and slender hairy petioles 1½–2 inches long. Leaflets 2–5 pairs on hairy stalks of ⅛ inch along slender hairy axis, the rounded apex usually with minute point or notch, the edges not toothed, the upper surface slightly shiny green with minute hairs, and the lower surface paler and soft hairy. A variation has large leaflets to 5 inches long.

Flower clusters (racemes) at bases of upper leaves bear many flowers on slender hairy stalks. The calyx has 5 unequal rounded greenish sepals about ¼ inch long; 5 elliptic unequal yellow petals stalked at base, 4 about ⅜ inch long and 1 about ⅝ inch; 7 stamens and 3 sterile stamens (staminodes); and slender curved pistil with long narrow 1-celled ovary and short style. There are many dull brown oblong seeds 3/16 inch long. Collected with flowers in June and October and with fruits from October to March.

The sapwood is yellow and the heartwood dark brown. The hard wood formerly was used elsewhere as a dyewood.

This species has served in home remedies.

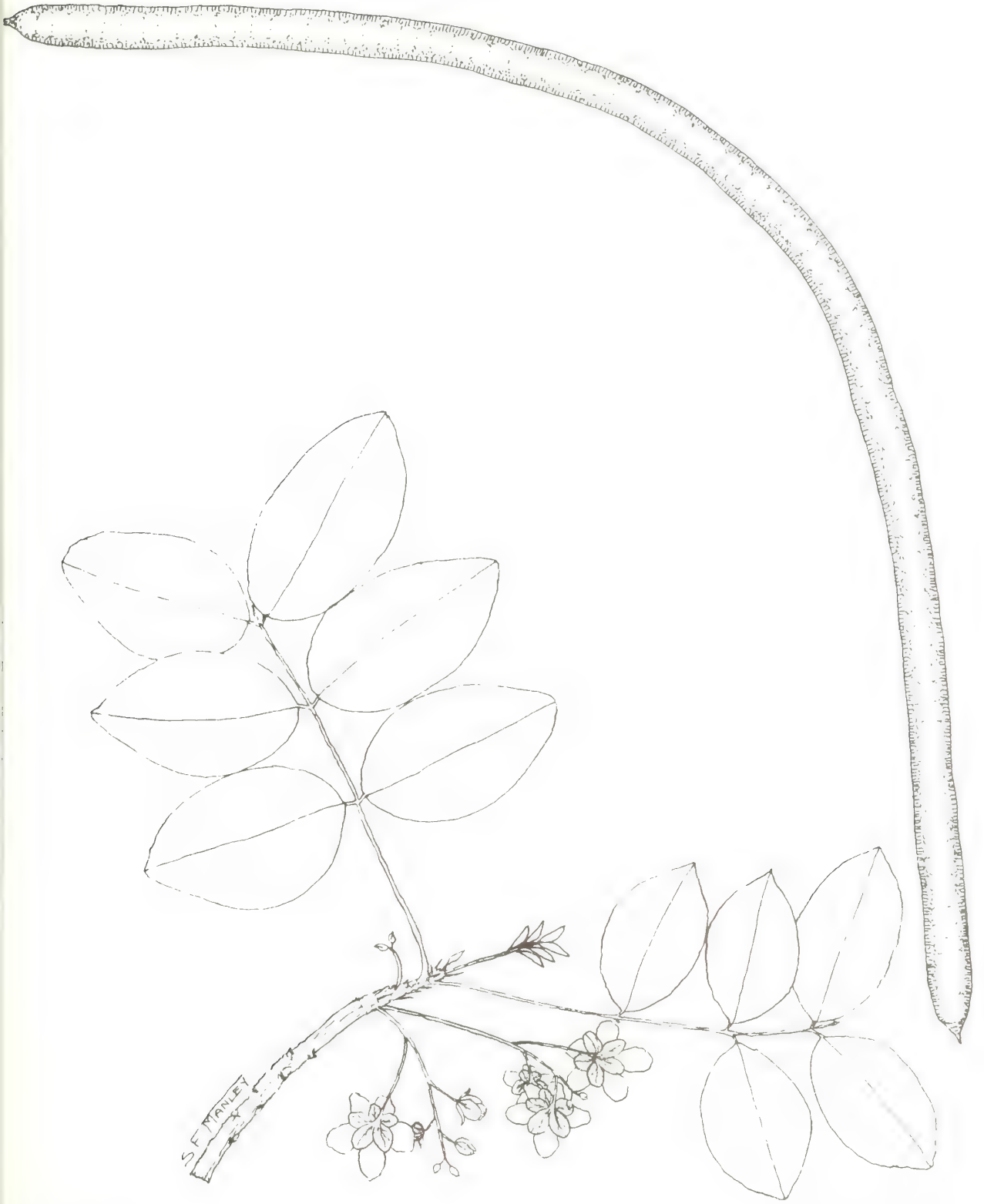
Rare in lower Cordillera at 500–1,000 feet altitude in south central foothills of Puerto Rico near Salinas and Coamo.

RANGE.—Greater Antilles, Antigua, Guadeloupe, St. Vincent, and from Mexico to Colombia, Venezuela, Isla Margarita, and Curacao.

OTHER COMMON NAMES.—palo de chivo, palo de burro (Dominican Republic); cañafístola cimarrona, carbonera (Cuba); flor de San José, alcaparro, chile perro, palo de zorrillo, palo hediondo (Mexico); arguchoco (El Salvador); vainillo (Guatemala, Nicaragua); chivato, platanito (Colombia); carángano, platanillo, mote extranjero, mucutero extranjero, brusco (Venezuela); barba de jolote (British Honduras); yellow candlewood, senna-tree (Jamaica); bois cabrite, casse marron (Haiti); petite casse (Guadeloupe).

BOTANICAL SYNONYM.—*Isandrina emarginata* (L.) Britton & Rose.

Thrips attacking the plants in late fall and winter cause the foliage to turn pale yellow green and easily distinguishable at a distance.



370. Velamuerto *Cassia emarginata* L.

Fruit (above), flowering twig (below), natural size.

371. Cañafístula cimarrona, pinkshower cassia ***Cassia grandis* L. f.***

Cañafístula cimarrona is a rare tree with showy pink flowers. Its distinguishing characters are: (1) the even pinnate leaves with 20–40 paired oblong leaflets densely soft hairy; (2) the large drooping clusters of flowers about 1 inch across the 5 rounded pink to purplish petals which turn to salmon in age; and (3) the very large and heavy cylindric dark brown pods 15–20 inches long and about 1¼ inches in diameter, slightly rough and cracked.

Medium-sized deciduous tree 45 feet high and 1 foot in trunk diameter or larger, with irregular spreading crown, evergreen where planted in humid areas. The bark is light brownish gray, smoothish with many fine warts and some horizontal lines. Inner bark is orange brown, gritty and slightly bitter. The twigs are long, slightly drooping to nearly horizontal, light green, finely hairy with rusty or gray hairs, and with 3 longitudinal ridges below each leaf. Buds are composed of very young rusty hairy leaves.

The even pinnate leaves are alternate in 2 rows and slightly drooping on the long twigs, 6–12 inches long, soft hairy with minute hairs. The paired stipules are tiny and inconspicuous. The light green axis is slender and grooved above. Leaflets drooping slightly on short hairy stalks 1/16 inch long are 1–2¼ inches long and ⅜–¾ inch wide, rounded with minute point at apex, rounded or slightly notched and unequal at base, thin, with straight edges. The upper surface green and slightly shiny, with many fine slightly sunken side veins, and the lower surface is dull light green. New growth of young leaves is yellow green and finely hairy.

Flower clusters (racemes) at leaf bases are 4–8 inches long, bearing many flowers on slender finely hairy stalks ⅜–¾ inch long. The flower is composed of 5-lobed greenish calyx ¼ inch long; nearly equal rounded pink to purplish petals about ½ inch long; 10 stamens including 3 curved and longer than petals, others much shorter, the 3 smallest nonfunctional; and pistil with stalked, slender, hairy curved 1-celled ovary and style.

The very large pods hang down and do not open. They are short pointed at both ends, have 1 ridge along one edge and 2 ridges on the other. Within are many thin cross walls ¼ inch or less apart, each with a seed in dark brown sweetish pulp or liquid. The seeds are elliptic and flattened, light brown, ⅝ inch long. Flowering in spring and maturing fruits in summer.

The wood is composed of thick whitish or brownish sapwood and heartwood variegated brown with light and dark, sometimes purplish, streaks and patches. It is of medium weight, hard and tough, coarse-textured, with straight to very irregular grain. The handsome wood has been used elsewhere in cabinetwork and construction.

The sweetish but ill-smelling pulp of the pods of this and related species has been used in home remedies as a laxative.

Apparently introduced in Puerto Rico though reported by Britton and Wilson (*10*) as native in dry forests of southwestern part. Rarely planted as an ornamental in towns and roadsides in Puerto Rico and Virgin Islands. Recorded by Britton and Wilson as naturalized on St. Croix and St. Thomas.

This showy ornamental is planted in southern Florida, Hawaii, and elsewhere in the tropics.

RANGE.—Greater Antilles, southern Mexico, Central America, and northern South America to Trinidad, Surinam, and northeastern Brazil. Planted in Lesser Antilles and naturalized locally.

OTHER COMMON NAMES.—gigantón (Puerto Rico); cañafístula (Spanish); cañafístula cimarrona, chácara (Dominican Republic); cañandonga, cañandonga de masa, cañafístola cimarrona (Cuba); cañafístula grande, quauhuayo (Mexico); carao (Central America); carago (El Salvador); caragua (El Salvador, Honduras, Nicaragua); carámano (Nicaragua); sándalo (Costa Rica); cañandonga, cañafístula gruesa (Colombia); mari-mari, cañafístula macho, cañafístula burrero, cañaflote (Venezuela); pinkshower cassia, pinkshower (English); horse cassia (Jamaica); beef-feed, bookoot, stinking-toe (British Honduras); coral-shower (Hawaii); casse, casse espagnole (Haiti); cañafistola, jeneuna, marimary preto, marimary rana, marimary saro (Brazil).

371. Cañafístula cimarrona, pinkshower cassia *Cassia grandis* L. f.

Leafy twig (above), flowers (lower left), natural size.

372. ***Cassia planisiliqua* L.***

A showy introduced ornamental shrub or small tree is identified by: (1) pinnate leaves with 8–20 paired oblong or elliptic leaflets whitish beneath, with a minute stalked gland between the lowest pairs; (2) bright yellow flowers about 2 inches broad, with 5 spreading petals slightly unequal and 10 nearly equal stamens; and (3) flat pods 4–8 inches long and ⅜–⅝ inch wide, ending in a curved bristle.

Evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter and with open crown of slender spreading branches. Bark light gray, smooth. Twigs finely hairy.

Leaves alternate, pinnate, 2–8 inches long, with threadlike paired stipules shedding early and with slender finely hairy axis bearing 8–20 paired leaflets on short hairy stalks less than 1/16 inch long and a minute stalked gland between each of the lowest pairs. Leaflets 1–3½ inches long and ¾–1½ inches wide, blunt and often slightly notched at apex, rounded at base, not toothed on edges, thin, the upper surface light green and becoming nearly hairless, and the lower surface whitish and slightly hairy with pressed hairs.

Flower clusters (racemes) lateral, long-stalked, flat-topped. Flowers several, composed of yellow 5-lobed calyx ⅜ inch long; 5 spreading elliptic bright yellow petals about 1 inch long and slightly unequal and narrowed at base; 10 nearly equal fertile stamens; and pistil with narrow curved hairy ovary and slender style. The pods are dark brown, flat, thin, nearly hairless. Seeds several, beanlike, ¼ inch long, elliptic, flattened, shiny dark brown. Flowering throughout the year.

Sparingly planted for ornament in coastal cities of Puerto Rico. A relatively recent introduction, still rare. Not listed by Britton and Wilson (*10*) and not recorded from Virgin Islands.

RANGE.—Native of East Indies and Australasia. Planted in West Indies and elsewhere in the tropics for ornament. Recorded as naturalized at one locality on Barbados.

OTHER COMMON NAME.—glaucous cassia (United States).

BOTANICAL SYNONYMS.—*Cassia glauca* Lam., *C. surattensis* Burm. f., *Psilorhegma planisiliqua* (L.) Britton & Rose.

372. *Cassia planisiliqua* L.*

Flowering twig (above), fruits (center right), two-thirds natural size.

373. Retama prieta ***Cassia polyphylla* Jacq.**

This ornamental shrub or small tree with long unbranched wandlike twigs, native in dry areas, is recognized by: (1) showy bright yellow flowers about 1½ inches across the 5 spreading elliptic petals; (2) small pinnate leaves 1–2 inches long, composed of 5–15 pairs of elliptic nearly stalkless leaflets mostly ¼ inch long and ⅛ inch wide, in clusters along the slender twigs; and (3) pods long, narrow, and flattened, 3–6 inches long and ¼ inch wide, brown to black and shiny.

Shrub or small tree to 15 feet high and 4 inches in trunk diameter, reported to become larger, much branched, with many slender spreading twigs, unbranched, curved, and slightly drooping at ends. Probably deciduous in dry areas. Bark of trunk and larger branches blackish, thick, furrowed into short scaly plates. Inner bark light brown and slightly bitter. The young twigs are very slender, dull light green, slightly hairy, the older twigs light brown, warty, and slightly fissured.

The leaves are alternate on rapidly growing twigs but mostly clustered 3–5 at nodes of older twigs. Stipules are paired, threadlike, about ⅛ inch long. The slender light green hairy axis bears leaflets almost to the base. Leaflets are slightly unequal at base and rounded with minute point at apex, thin, with veins inconspicuous, dull green above and light green beneath, becoming nearly hairless, those of a pair folding together at night.

Flowers 2–3 on slender green stalks nearly 1 inch long at leaf bases. The calyx is composed of 5 unequal elliptic yellowish green sepals ¼–⅜ inch long; corolla of 5 slightly unequal elliptic petals about 1 inch long, short-stalked at base; stamens 7, unequal, with long brownish anthers, and 3 minute nonfunctioning stamens (staminodes); and pistil with very narrow curved greenish hairy ovary and short stigma. The pods have a short stalk at base and short point at apex, are flattened between the flat seeds, and split open along 2 lines. Flowering and fruiting throughout the year.

The wood is light brown and hard.

Locally common in shrub thickets and dry forests of south coast and lower Cordillera from sea level to 1,000 feet altitude in Puerto Rico from Guayama to Guánica and Cabo Rojo. Also St. Croix, St. Thomas, St. John, and Anegada. Sometimes grown for ornament. Recorded as cultivated at Grenada.

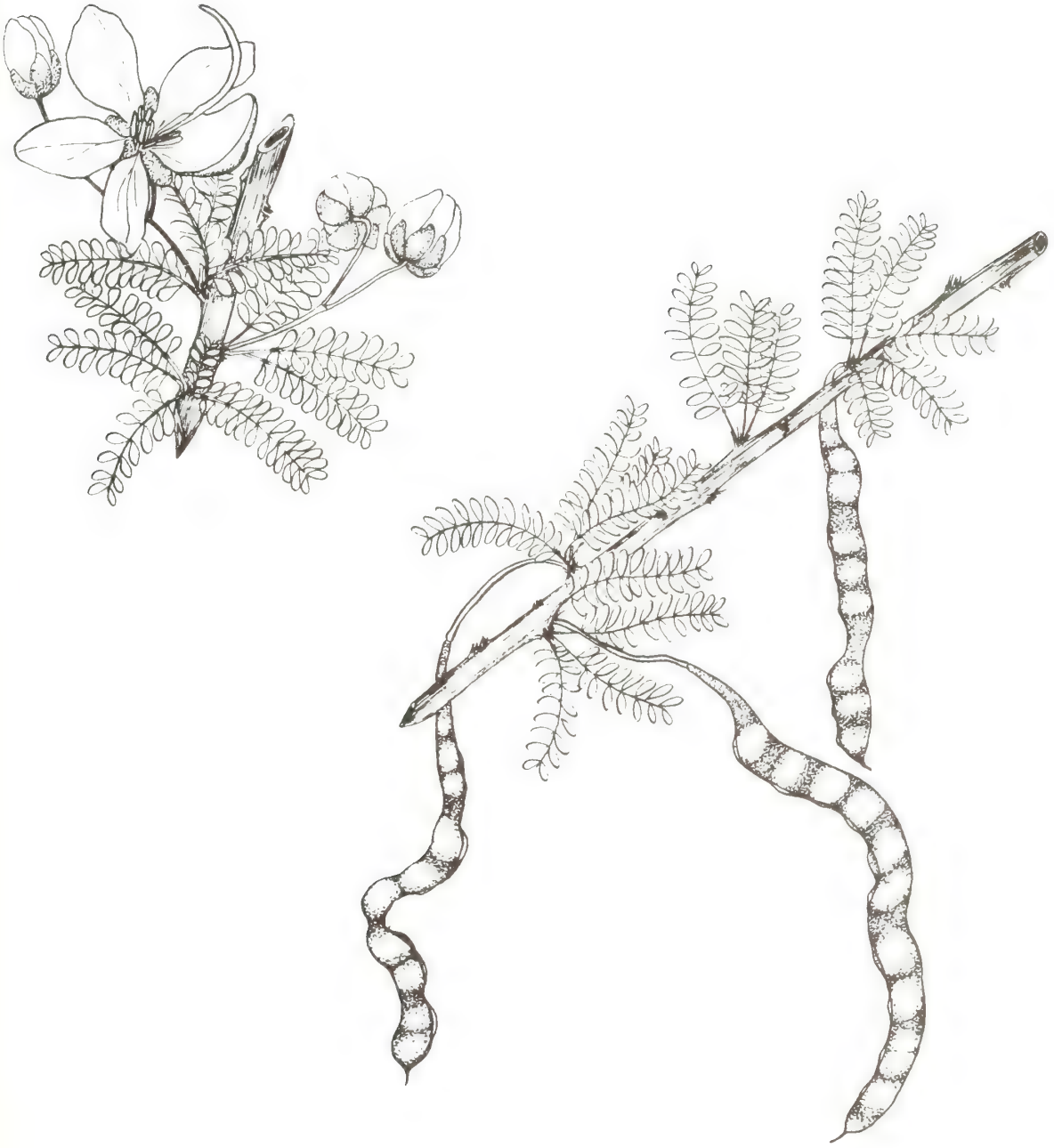
PUBLIC FORESTS AND PARK.—Guánica, Susúa; Virgin Islands.

RANGE.—Hispaniola (Dominican Republic), Puerto Rico, and Virgin Islands.

OTHER COMMON NAMES.—retama, hediondilla (Puerto Rico).

BOTANICAL SYNONYM.—*Peiranisia polyphylla* (Jacq.) Britton & Rose.

This species was named in 1790 from plants of Puerto Rican origin that grew in the greenhouse of the Royal Garden near Vienna, Austria.



373. Retama prieta *Cassia polyphylla* Jacq.

Flowering twig (upper left), fruiting twig (lower right), natural size.

374. ***Cassia spectabilis* DC.***

This introduced ornamental and shade tree is characterized by: (1) large pinnate leaves 8–18 inches long with 12–30 paired oblong-lanceolate leaflets long-pointed and soft hairy beneath; (2) very large clusters of many showy yellow flowers 1½–2 inches across the 5 elliptic spreading petals; and (3) blackish cylindric pods 8–12 inches long and ⅜–½ inch in diameter, with many horizontal walls.

Medium-sized deciduous planted tree to 50 feet high and 1 foot in trunk diameter, with spreading crown. Bark gray, smoothish, with many warts and short fissures. Twigs stout, brown with light dots (lenticels), finely hairy.

Leaves alternate, pinnate, with slender light green finely hairy axis and paired threadlike stipules, without glands. Leaflets with short stalks about ⅛ inch long are 1½–2½ inches long and ⅝–⅞ inch wide, long-pointed at apex, short-pointed at base, not toothed on edges, thin, upper surface dull green and almost hairless, with many slightly sunken side veins, and lower surface dull light green and soft hairy or sometimes nearly hairless.

Flower clusters (panicles) terminal and lateral, branched and very large, 6–24 inches long. Flowers many, fragrant, composed of 5 rounded hairy yellow sepals about ¼ inch long; 5 elliptic slightly unequal yellow petals ¾–1 inch long, narrowed into stalklike base; stamens 7 large and 3 small sterile (staminodes); and slender curved hairless pistil. Pods ending in a short narrow point, hard, not splitting open or slightly on 1 side, with many cross walls about ⅛ inch or less apart. Seeds 1 in each division, ⅛ inch in diameter and flattened, brown. Flowering throughout the year.

The sapwood is whitish, and the heartwood brown. The wood is described as hard, heavy, and durable.

Uncommon as an ornamental and shade tree and along roadsides, also escaping from cultivation. Very fast growing. Planted in the subtropical moist and lower and upper Cordillera zones in central Puerto Rico from sea level to 2,500 feet altitude and best adapted to dry slopes. A relatively recent introduction in Puerto Rico and St. Croix.

This species is planted also as an ornamental and shade tree in southern Florida, where it flowers in early winter and is rated as excellent.

RANGE.—Southern Mexico through Central America to Colombia, Venezuela, and Tobago. Planted through tropical America including southern Florida, West Indies, and south to Brazil, Bolivia, and Peru.

OTHER COMMON NAMES.—chucaro, bruscón, pela burro, libertad (Dominican Republic); algarrobillo (Cuba); canchín (Mexico); candelillo, frijolillo (Honduras); candelillo (Costa Rica); cañafístula macho (Colombia, Venezuela); velero, velillo (Colombia); cañafístula bobo, cañafístula cimarróna, chiquichique, mucuteno, tarantán (Venezuela); frijolillo (Ecuador); mutuy (Peru); yellow shower, calceolaria shower (United States); pisabed (British Honduras); casse marron (Haiti); parica (Brazil).

BOTANICAL SYNONYM.—*Pseudocassia spectabilis* (DC.) Britton & Rose.

374. *Cassia spectabilis* DC.*

Flowers (upper left), leaf (below), fruit (right), two-thirds natural size.

375. Oreganillo ***Cynometra portoricensis* Krug & Urban**

This rare tree of moist lowland forests is easily recognized by: (1) leaves with small twin or paired leaflets, $\frac{3}{4}$–$1\frac{3}{4}$ inches long and $\frac{3}{8}$–$\frac{5}{8}$ inch wide, narrowly oblong or obovate and with unequal sides and slightly notched at the blunt apex; and (2) the oblong pods $\frac{3}{4}$–$1\frac{1}{4}$ inches long and $\frac{1}{2}$–$\frac{5}{8}$ inch broad, flat and slightly curved.

Small to medium-sized evergreen tree to 50 feet high and 14 inches in trunk diameter, with thin spreading crown. The bark of small trunks is gray or brownish, smooth, with many dots (lenticels). Inner bark is pinkish, fibrous, and slightly bitter. Twigs are slender, slightly zigzag, dark brown, and finely hairy when young.

The alternate leaves spreading in 2 rows on horizontal twigs have slender dark brown hairy petioles about $\frac{1}{8}$ inch long and minute threadlike stipules which shed early. The 2 leaflets are stalkless, obliquely and narrowly oblong or obovate, slightly thickened, hairless, slightly notched at the blunt apex, rounded and unequal at base, the sides very unequal with network of veins, border not toothed, the upper surface dark green and slightly shiny, the lower surface dull light green.

A few small white flowers are borne in short clusters (racemes) at leaf bases, on slender hairy stalks less than $\frac{1}{4}$ inch long. The flowers about $\frac{3}{8}$ inch long consist of calyx $\frac{5}{16}$ inch long with 4 or 5 sepals, 5 nearly equal petals about $\frac{3}{8}$ inch long, 10 separate stamens, and pistil with hairy ovary and threadlike style. The pods are brown, finely warty, thick-walled and hairy, 1-seeded. Flowering mainly in spring. Fruits maturing in summer, persistent into winter.

The sapwood is whitish and hard.

Rare and local in moist limestone forest of Puerto Rico, including northeastern, northwestern, and southwestern parts, at 100–600 feet altitude.

RANGE.—Puerto Rico and Hispaniola (Dominican Republic).

OTHER COMMON NAME.—algarrobillo (Dominican Republic).

375. Oreganillo *Cynometra portoricensis* Krug & Urban

Flowering twig (left), fruiting twig (right), natural size.

376. Campeche, logwood — *Haematoxylum campechianum* L.*

Campeche or logwood, at one time an important source of dye, has been planted, escaping from cultivation and becoming naturalized in dry areas of Puerto Rico and the Virgin Islands. It is recognized by: (1) the trunks ridged or angled and fluted, branching near base; (2) even pinnate leaves with 4–8 paired leaflets reverse heart-shaped (obovate) or wedge-shaped, notched at apex and tapering to blunt base; (3) light yellow flowers showy, nearly ½ inch broad, many in unbranched clusters at base of leaves; and (4) the distinctive oblong light brown pods 1–2½ inches long and ¼–½ inch wide, thin and papery, splitting open down the middle instead of along edges.

Deciduous small to medium-sized tree becoming 30 feet high, with several short crooked trunks to 2 feet in diameter and with thin spreading crown. The trunks become angled and fluted, with long ridges and grooves. The bark is light brown or gray, smoothish to fissured or furrowed, rough, and slightly shaggy. The inner bark is light brown and gritty. Twigs are gray, smooth with many dots (lenticels), hairless.

The leaves are alternate or 2–4 at older nodes, 2–4 inches long, with slender minutely hairy axis 1–3 inches long. Stipules shed early or sometimes persist as stout spines ¼–⅝ inch in length. The paired leaflets on stalks less than 1/16 inch long are smallest at base of leaf and largest at apex. Blades are ½–1½ inches long and ⅜–1¼ inches wide, sometimes smaller, thin, with many fine parallel side veins, hairless. The upper surface is green and slightly shiny, the lower surface dull light green.

Flower clusters (racemes) 1–3 inches long (longer in fruit) at leaf bases bear many fragrant flowers on slender stalks less than ¼ inch long. The calyx is composed of 5 unequal narrow purplish or reddish sepals about 3/16 inch long; the 5 light yellow petals are oblong and slightly unequal, about ¼ inch long; stamens 10, separate, longer than petals, light yellow, with hairy filaments; and the pistil with 1-celled ovary, 2–3 ovules, curved style, and dot stigma. The pods clustered among the leaves are pointed at both ends and contain 1–3 oblong flat seeds 5/16 inch long. Flowering from December to May. Old fruits remain attached for several months.

The thin sapwood is whitish and the heartwood orange, becoming dark red after exposure. The wood is very hard, heavy (specific gravity 0.95–1.00), medium to fine-textured, of irregular grain, strong but brittle, very resistant to decay, and takes a high polish. Fresh wood has an odor of violets and a sweetish taste. Uses include cabinetwork and posts.

The dye haematoxylin is obtained from the heartwood in small chips by boiling, changing color from orange red to yellowish upon cooling and finally black. By the use of mordants, black and bluish-black shades are obtained. Many shiploads of this valuable dyewood were sent to Europe over a period of centuries before these dyes became largely replaced by synthetic dyes. The wood is still used locally for coloring wool textiles. Other uses are stains for biological microscopic slides and inks. Haematoxylin is also a drug used as an astringent, such as for dysentery and diarrhea. British Honduras was founded as a colony in 1638 mainly for export of mahogany and logwood, which was common in the lowland forests. After introduction into the West Indies, Jamaica, Haiti, and other islands exported the logs.

The trees are grown occasionally as ornamentals and in fences. An important honey plant where common.

Campeche or logwood has been planted and has become naturalized in the dry forests in thickets, and along roadsides in southern and southwestern Puerto Rico. Also, Mona, St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC FORESTS.—Guánica, Estate Thomas.

RANGE.—Native of southeastern Mexico mainly in Yucatán Peninsula, British Honduras, and Guatemala. Spread by planting in West Indies from Bahamas to Lesser Antilles, Central America, and northern South America. Introduced long ago into the West Indies and naturalized on many islands.

OTHER COMMON NAMES.—campeche, palo campeche, palo de tinta, tinta, palo de tinte, tinto (Spanish); palo negro (Cuba); logwood (English); bois campêche, campêche (French).

Common and scientific names refer to the Mexican State of Campeche, where this species is native. *Haematoxylum* means bloodwood.

376. Campeche, logwood *Haematoxylum campechianum* L.*

Flowering twig (lower left), fruiting twig (upper right), natural size.

PEA SUBFAMILY (FABOIDEAE; FABACEAE)

Herbs mostly in temperate regions and shrubs and trees mostly in tropical regions, known by: (1) leaves pinnate, sometimes of 3 leaflets (rarely simple), never bipinnate, the leaflets often with stipules; (2) flowers very irregular, in shape of bean flower or butterfly; (3) petals 5, very unequal, overlapping in bud, the standard (largest and outermost in bud), 2 on the sides called wings, and 2 slightly united forming the keel; and (4) stamens 10–9 usually united in 2 or 1 group, often 9 united and 1 separate. Also vol. 1, p. 188.

Key to species

A. Leaves with 3 leaflets; twigs often spiny (except No. 82)—*Erythrina.*
- B. Leaflets with 1 main vein, mostly about twice as long as broad; flowers broad and spreading.
  - C. Leaflets elliptic to ovate, rounded or short-pointed at both ends, slightly thickened, whitish green and finely hairy beneath; flowers orange or salmon colored—83. Bucare, swamp immortelle, *Erythrina fusca* Lour. (*E. glauca*).
  - CC. Leaflets narrowly elliptic to oblong, short-pointed at both ends, thin, dull green beneath, hairless; flowers crimson and scarlet—379. *Erythrina crista-galli.**
- BB. Leaflets with 3 main veins from straight or blunt-pointed base, about as wide as long, hairless.
  - D. Flowers broad and spreading, erect on horizontal axes, orange red—84. Bucayo gigante, mountain immortelle, *Erythrina poeppigiana* (Walp.) O. F. Cook.*
  - DD. Flowers very long and narrow, resembling a machete or sword, horizontal on vertical axes, red to scarlet.
    - E. Spines absent from twigs; leaflets blunt-pointed at base and often nearly diamond-shaped, whitish green beneath—82. Bucare enano, machette, *Erythrina berteroana* Urban.*
    - EE. Spines on twigs; leaflets straight or nearly so at base and nearly triangular, greenish beneath.
      - F. Spines on twigs scattered, short, less than ⅛ inch long—381. *Erythrina variegata.**
      - FF. Spines on twigs numerous, long and stout, to ¼ inch or more.
        - G. Leaves not spiny; flowers more than 2 inches long, coral red—378. *Erythrina corallodendrum.*
        - GG. Leaves with spines scattered along axis and veins; flowers less than 2 inches long, red —380. *Erythrina eggersii.*

AA. Leaves pinnate.
- H. Twigs spiny.
  - I. Spines straight, slender; leaflets rounded, with yellowish spiny or bristle tip—88. Tachuelo, fustic, *Pictetia aculecta* (Vahl) Urban.
  - II. Spines curved, stout; leaflets oblong, rounded at apex, not spiny—385. *Machaerium lunatum.*
- HH. Twigs without spines.
  - J. Leaves with all leaflets paired (even pinnate), oblong.
    - K. Leaflets 10–30 pairs, ¾–1½ inches long, rounded at both ends—91. Báculo, agati, *Sesbania grandiflora* (L.) Pers.*
    - KK. Leaflets 5–15 pairs, ⅜–⅝ inch long, rounded at both ends with a minute point at apex—389. *Sabinea florida.*
  - JJ. Leaves with odd number of leaflets, 1 at end (odd pinnate).
    - L. Leaflets paired (opposite) except for 1 at end.
      - M. Leaves opposite with 7 or 9 ovate leaflets—382. *Hebestigma cubense.**
      - MM. Leaves alternate, leaflets various.
        - N. Leaflets with many nearly straight parallel lateral veins.
          - O. Leaflets slightly thickened, with lateral veins slightly sunken and edges turned under—87. Palo de matos, *Ormosia krugii* Urban.
          - OO. Leaflets thin, with lateral veins not sunken and edges not turned under—387. *Piscidia carthagenensis.*
        - NN. Leaflets with few to many curved lateral veins.
          - P. Leaflets shiny green on upper surface, with pair of bristlelike scales (stipels) between each pair—81. Moca, cabbage angelin, *Andira inermis* (W. Wright) DC.
          - PP. Leaflets dull green, without scales between each pair.
            - Q. Leaflets 7–17, mostly less than 2 inches long—85. Mata-ratón, mother-of-cocoa, *Gliricidia sepium* (Jacq.) Kunth.*
            - QQ. Leaflets 5–9 (11), mostly more than 2 inches long—*Lonchocarpus.*
              - R. Leaflets blunt with minute notch at apex, beneath slightly whitish green and hairless; twigs hairless; pods leathery, not or slightly narrowed between seeds—384. *Lonchocarpus glaucifolius.*
              - RR. Leaflets blunt to long-pointed and without notch at apex, beneath light green and hairy; twigs finely hairy when young.
                - S. Leaflets mostly blunt-pointed at base; pods thick, leathery, deeply narrowed between seeds—383. *Lonchocarpus domingensis.*
                - SS. Leaflets mostly rounded at base; pods thin, papery, not narrowed between seeds—86. Retama, *Lonchocarpus pentaphyllus* (Poir.) DC. (*L. latifolius*).
    - LL. Leaflets all attached singly (alternate).
      - T. Leaflets 3–5, nearly round, along zigzag axis—377. *Dalbergia sissoo.**
      - TT. Leaflets mostly more than 5, more than twice as long as broad, along straight axis.
        - U. Leaflets 11–17, oblong, less than 1¼ inches long, with lines and dots visible with lens against the light—386. *Myrospermum frutescens.**
        - UU. Leaflets mostly 5–9, elliptic, more than 2 inches long, without lines and dots—*Pterocarpus.*
          - V. Leaflets rounded at base—90. Palo de pollo, swamp bloodwood, *Pterocarpus officinalis* Jacq.
          - VV. Leaflets blunt-pointed at base.
            - W. Pods 1¼–1½ inches in diameter—89. Pterocarpus, India padauk, *Pterocarpus indicus* Willd.*
            - WW. Pods 2–2¾ inches in diameter—388. *Pterocarpus macrocarpus.**

377. Sisu, Indian rosewood — *Dalbergia sissoo* Roxb.*

Indian rosewood, or sissoo (sisu), from India has been introduced in forestry tests. It is characterized by: (1) pinnate leaves with 3–5 rounded abruptly short-pointed leaflets alternate on a very slender zigzag axis; (2) many small whitish irregular flowers like those of beans, borne in short lateral clusters; and (3) oblong flat thin pods 1½–3 inches long and ⅜–½ inch wide.

A medium-sized tree 35 feet high and 1 foot in trunk diameter with rounded open crown of spreading branches, evergreen or almost deciduous. Bark gray, scaly, deeply furrowed. Twigs green to gray, very slender.

Leaves alternate, pinnate, about 6 inches long, hairy when young. Leaflets with stout stalks to ¼ inch, almost at right angles to axis. Leaflet blades nearly round, 1–2 inches long and broad, rounded or blunt at base, rounded and abruptly short-pointed at apex, not toothed on edges, thin, with many fine parallel side veins.

Flower clusters (panicles) 2–4 inches long at leaf bases and nodes back of leaves, branching, hairy. Flowers about ⅜ inch long, fragrant, consisting of hairy calyx with 5 teeth; corolla with 5 petals, the standard broad, 2 narrow wings, and narrow keel of 2 united; stamens 9, united into broad stalk; and stalked hairy pistil with narrow 1-celled ovary containing few ovules, short style, and dot stigma. The light brown pod is narrowed at both ends, stalked at base, and does not split open. Seeds 1–3, beanlike, ¼–⅜ inch long.

Sissoo belongs to the genus of rosewoods, handsome cabinetwoods with attractive grain and color and roselike fragrance. In the native home the wood has been used for furniture, cabinets, flooring, boats, and wood carvings. Young branches and foliage have served also as fodder.

Recommended as one of the most desirable nonflowering shade trees for central and south Florida. Planted also in southern Arizona. It grows very fast, is drought resistant and salt tolerant, and is adapted to a wide range of sites including yards and streets, windbreaks, dry ridges, filled areas, and river spoil banks. Cut roots produce suckers. After maturing, the trees should have another use as a cabinetwood.

This species is rare in Puerto Rico but is being tested in scattered forest plantings at El Verde, Guayabol, and Cayey.

PUBLIC FOREST.—Luquillo.

RANGE.—Native of India. Widely planted in tropical countries for wood and shade. Reported to be spreading from cultivation in southern Florida.

OTHER COMMON NAMES.—sissoo (India, commerce); Indian rosewood, sissoo (English).

377. Sisu, Indian rosewood *Dalbergia sissoo* Roxb.*

Fruiting twig (above), flowering twig (below), two-thirds natural size.

378. Bucare, coraltree ***Erythrina corallodendrum* L.**

This small tree is characterized by: (1) sharp stout spines or prickles to ¾ inch long usually present on trunk and branches; (2) alternate leaves with 3 wedge-shaped thin leaflets long-pointed at apex and nearly straight at base; (3) large coral red or blood red flowers about 2–2½ inches long, narrow, with bell-shaped calyx; and (3) pods 4–6 inches long and ⅜–⅝ inch long, narrowed between the several beanlike seeds, which are scarlet with a black spot and poisonous.

Deciduous shrub or small tree to 25 feet high and 8 inches in trunk diameter. The leaves mostly 6–12 inches long, becoming hairless, have slender petioles 1½–6 inches long, often spiny, and leaflet stalks ⅛–¼ inch long. Leaflet blades are thin, mostly 2–4 inches long and wide, sometimes to 6 inches, wedge-shaped or broadly ovate, not toothed on edges, with 3 main veins from base, dull green above and paler beneath.

Flower clusters (racemes) 4–12 inches long bear along 1 side many almost stalkless flowers in groups of 2–3. The narrow bell-shaped calyx ⅜–⅝ inch long is straight at apex; petals 5, coral red or blood red, the narrowly oblong folded standard 2–2¼ inches long, the 4 others (wings and keel) very small, mostly ¼–⅜ inch long; 10 stamens 1½–2 inches long, united into tube toward base; and pistil 1¼–2 inches long, very narrow, consisting of finely hairy stalked ovary and style. The pods are beadlike and slightly flattened, long-stalked and long-pointed. Seeds are about ⅜ inch long. Flowering mostly in late winter to March, usually when leafless, and maturing fruits mostly in spring.

Rare in southern coast and lower Cordillera forest of Puerto Rico at 100–500 feet altitude, mostly in dry areas. Also in St. Croix, St. Thomas, St. John, and Tortola (introduced). In cultivation for the showy flowers and as a living fence.

Planted as an ornamental elsewhere in tropical America north to southern and central Florida. Propagated by seeds and cuttings.

RANGE.—Jamaica, Hispaniola, Puerto Rico and Virgin Islands, and Lesser Antilles from St. Martin and Saba to Grenada, and Trinidad and Tobago. The range extended by cultivation.

OTHER COMMON NAMES.—piñón espinoso, bucare (Puerto Rico); amapola (Dominican Republic); common coralbean (English); coraltree, red-bean-tree (Jamaica); bois immortel (St. Lucia, Grenada); jumby cutlass (St. Vincent); lent-tree, Judas-tree, devils-tree, jumbie-bead (Barbados); coralbean, jumbie-bead, wild immortelle (Trinidad and Tobago); immortel, immortel-pays (Guadeloupe, Martinique); petit immortel (Guadeloupe); coraltree, bois immortel, immortel (Dominica).

The showy red-and-black seeds of this and related species, also the pods, contain a dangerous poison and should never be eaten. These toxic seeds have been strung into necklaces, bracelets, and novelties, which could poison children. However, it is reported that the young flowers and young leaves of certain species have been cooked and eaten in limited quantities.

The seeds and decoctions of various species have served in home remedies.

378. Bucare, coraltree *Erythrina corallodendrum* L.

Flowers (left), leaf (right), natural size.

379. Cresta de gallo, cockscomb coralbean ***Erythrina crista-galli* L.***

A spiny shrub or small tree planted as an ornamental for its showy clusters of large brilliant crimson or scarlet flowers in early spring when leafless. It is distinguished by: (1) curved spines or prickles on twigs and leaves; (2) leaves with 3 large elliptic or ovate leaflets, the lower surfaces whitish and waxy and often with spines on midvein; (3) 1–3 large crimson flowers 1¼–1¾ inches long, with 1 broad spreading petal; and (4) narrowly cylindric pods 6–12 inches long and ½–⅝ inch broad, hard-walled, with several elliptic seeds black with brown markings (not red), probably poisonous.

A planted ornamental deciduous shrub or small tree to 15 feet high, with short trunk 4 inches in diameter and with slender branches and thin crown, often vinelike. Twigs slender, often spiny.

Leaves alternate, compound, 4–10 inches long, becoming hairless, with spiny petiole 2–5 inches long and 3 leaflets on stalks of ¼–⅝ inch. Leaflet blades are elliptic or ovate, 2½–3½ inches long and 1–1½ inches broad, the end one largest and with the longest stalk, short-pointed or blunt at apex and base, not toothed on edges, thin, the upper surface green, and the lower surface whitish and waxy.

The irregular flowers 1–3 in groups along end of twig or at base of leaf on slender stalks ½–2½ inches long are composed of bell-shaped reddish brown calyx unequally 5-toothed; corolla of 5 crimson petals including 1 very broad spreading petal (standard) 1¼–1¾ inches long and 1 inch broad, 2 short side petals (wings) ⅜–½ inch long, and 2 long narrow petals (keel) 1¼–2 inches long; stamens 9 in a tube and 1 separate; and pistil with stalked narrow ovary and slender style. The pods are long-pointed at both ends, slightly narrowed between the few seeds ½–¾ inch long. Flowering in early spring when leafless, the fruits maturing in spring and persisting. The branches die back after flowering.

The wood is described as soft and very lightweight.

The bark has been used in medicines.

Planted occasionally for ornament in parks and gardens in Puerto Rico and the Virgin Islands and elsewhere in West Indies. Northward in warm temperate climates, as in southern United States, the shrubby plants bloom in summer and die back nearly to the roots in winter. In cold climates the large fleshy roots can be stored indoors in winter or the plants grown in greenhouses. Horticultural varieties have different shades of red flowers.

In central and south Florida this species is recommended as a beautiful small flowering tree for yards, parks, and gardens. It is propagated by cuttings or air layering and grows rapidly in moist fertile soil. Planted also in southern Arizona.

RANGE.—Native of southern Brazil, Paraguay, Uruguay, and northern Argentina. Widely cultivated through the tropics.

OTHER COMMON NAMES.—cresta de gallo (Spanish); coral (Dominican Republic); ceibo (Paraguay, Uruguay, Argentina); seibo (Argentina); cockscomb coralbean, common coraltree, cockscomb coraltree (English); crête-de-coq, erythrine crête-de-coq (French).

Known as El Seibo, this species is the national flower of Argentina. The scientific name and approved common names refer to the resemblance of the showy flowers.

379. Cresta de gallo, cockscomb coralbean *Erythrina crista-galli* L.*

Flowers (above), leaf (below), two-thirds natural size.

380. Piñón espinoso, cockspur ***Erythrina eggersii*** **Krukoff & Moldenke**

This very spiny small tree, sometimes vinelike, is native only in Puerto Rico and the Virgin Islands. It is identified by: (1) abundant stout spines or prickles 1/8–1/4 inch long on leaves, twig, and trunk; (2) alternate leaves with 3 wedge-shaped thin leaflets short-pointed at apex and nearly straight at base, bearing spines or prickles 1/8 inch long on petiole and main veins on both surfaces; (3) showy red flowers 1 1/2–2 1/2 inches long but narrow, with bell-shaped calyx; and (4) pods 4–8 inches long and 5/8 inch wide, narrowed between the several beanlike seeds, which are yellow or bright red, without a black spot, probably poisonous.

Deciduous shrub or small tree to 30 feet high and 5 inches in trunk diameter, or sometimes vinelike. The bark is brown, slightly fissured, with many spines 1/4 inch long. Twigs are stout, green, becoming gray, very spiny, hairless.

The hairless leaves are mostly 5–10 inches long, with slender spiny petioles 2–5 inches long and axis 1–1 1/2 inches longer. Leaflet stalks are 1/8–1/4 inch long, with minute paired glands at base. Leaflet blades are thin, mostly 2–4 inches long and wide, wedge-shaped or broadly ovate, rounded to short-pointed at apex, mostly straight or notched at base, not toothed on edges, with 3 main veins from base, dull green above and paler beneath.

Flower clusters (racemes) bear many short-stalked long narrow flowers. The narrow cylindric calyx 3/8–1/2 inch long is straight or minutely toothed at apex; petals 5, red, the narrowly oblong folded standard 1 1/2–2 1/2 inches long, the 4 others (wings and keel) very small, 3/16 inch long; 10 stamens 1 1/4–1 3/4 inches long, united into tube toward base; and pistil 1 1/4–1 3/4 inches long, very narrow, consisting of finely hairy stalked ovary and slender style. The pods end in a long point. Seeds beanlike, elliptic, 1/2 inch long. Flowering in late winter from December to March, maturing fruits in spring and summer.

This native plant is sometimes grown as an ornamental for the showy flowers and as a living fence.

Uncommon in moist limestone forest at 100–400 feet altitude in northern Puerto Rico, Vieques, St. Thomas, St. John, and St. Croix.

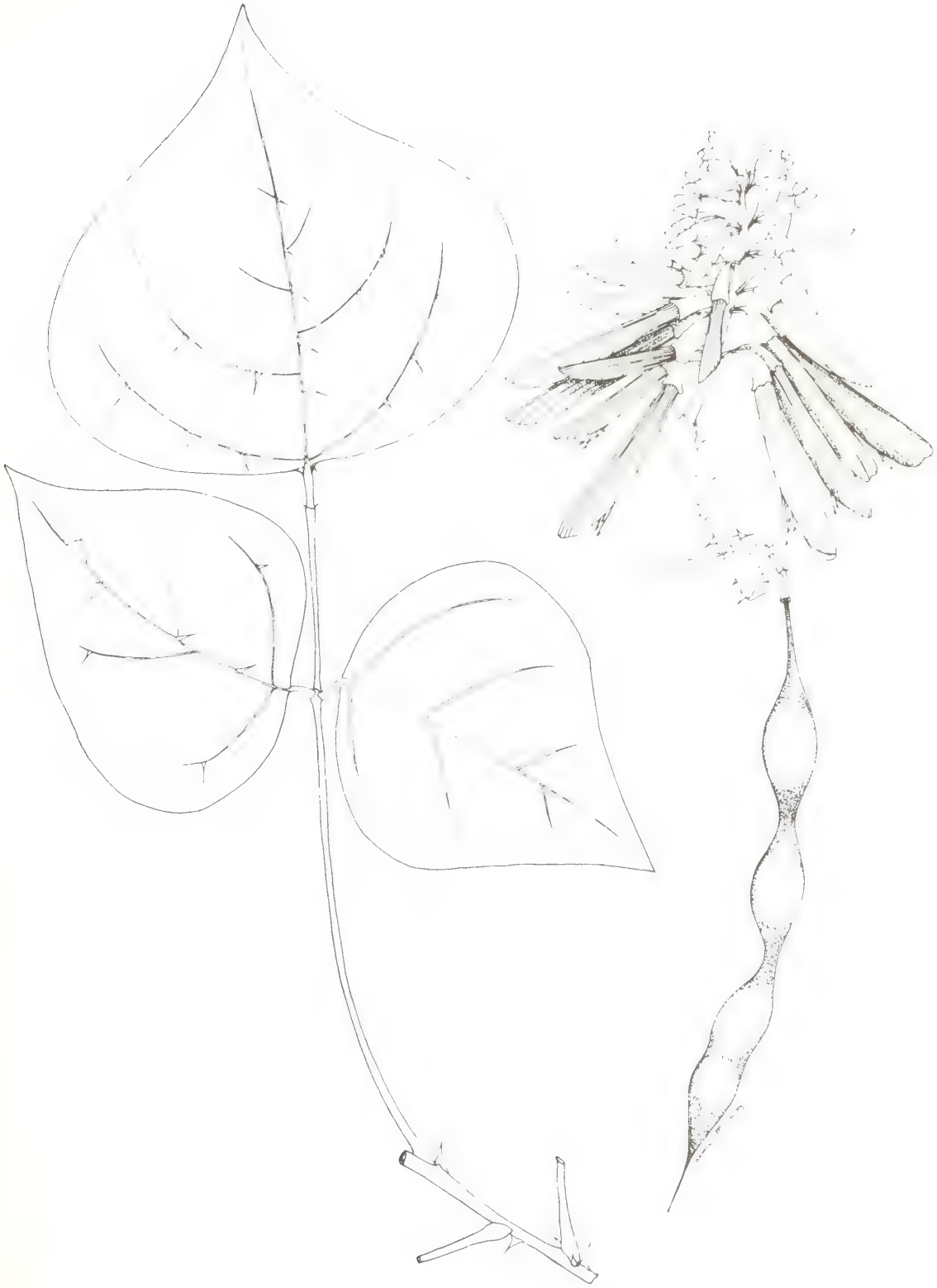
PUBLIC FORESTS.—Cambalache, Guajataca, Vega.

RANGE.—Native only in Puerto Rico and Virgin Islands. Introduced into Carriacou (The Grenadines) and perhaps other islands.

OTHER COMMON NAMES.—bucare, bucayo, coral, coral vegetal, espuelo de gallo (Puerto Rico).

BOTANICAL SYNONYM.—*Erythrina horrida* Eggers, not DC.

This species honors its discoverer, Henrik Franz Alexander von Eggers (1844–1903), Danish army captain in the Virgin Islands. He made extensive plant collections in the West Indies and continental tropical America. His flora of the Virgin Islands (*21*) was published in 1879 by the United States National Museum.



380. Piñón espinoso, cockspur *Erythrina eggersii* Krukoff & Moldenke

Leaf (left), flowers (upper right), fruit (lower right), two-thirds natural size.

381. Bucare, immortelle ***Erythrina variegata* L.***

An introduced ornamental distinguished by: (1) sharp small inconspicuous blackish spines or prickles 1/16–1/8 inch long like pins, usually present along twigs and persistent on trunk; (2) alternate leaves with 3 wedge-shaped thin leaflets about as broad as long, short-pointed at apex and nearly straight at base, dull green, paler beneath; (3) large showy scarlet flowers about 2½ inches long but narrow, with prominent spreading stamens, crowded in erect clusters; and (4) stout blackish pods 6–12 inches long and ¾–1 inch broad, slightly narrowed between the several dark red, poisonous seeds.

A deciduous small tree 30 feet high and 1 foot in trunk diameter or in age and where native a large tree, with many erect and spreading branches. The bark is light greenish gray, smoothish, becoming slightly streaked and fissured, with scattered short spines 1/8 inch long. Inner bark beneath a thin light green outer layer is light brown and almost tasteless. Twigs are light green with minute hairs when young, becoming light gray, smooth except for scattered sharp blackish spines or prickles and with slightly raised half-round leaf scars and light colored dots (lenticels).

The leaves 7–11 inches long, with star-shaped hairs but becoming nearly hairless, have slender round light green petioles 3–5 inches long, enlarged at base, and extended nearly 1 inch as an axis. Leaflet stalks are about 3/8 inch long, with minute paired green glands at base. Leaflet blades are thin, mostly 2–5 inches long and wide, wedge-shaped or broadly ovate, not toothed on edges, with 3 main veins from base.

Flower clusters, (racemes) about 6–8 inches long bear numerous crowded flowers, with smaller buds toward apex. The narrow tubular, pointed reddish calyx about 1 inch long splits open nearly to base on 1 side; petals 5, scarlet, the oblong folded standard erect or nearly so, 2¼–2½ inches long, the 2 elliptic wings and keel about 5/8 inch long; 10 stamens about 2 inches long, 9 united into a tube toward base; and the pistil 1¾ inches long, very narrow, composed of finely hairy stalked ovary and slender style. The beanlike red seeds are 5/8–¾ inch long. Flowering mostly in winter, sometimes to April. Fruits in spring, seldom maturing.

The wood is light brown and soft.

Leaves, bark, and fresh flowers have served elsewhere in home remedies.

Uncommon as an introduced ornamental along roadsides and in fencerows up to 200 feet altitude in northeastern Puerto Rico, Culebra, Vieques, and the larger Virgin Islands from St. Croix to Tortola. A favorite ornamental in Tortola known as immortelle. In southern and central Florida under the name Indian coralbean, this showy large spreading tree with brilliant red blossoms is conspicuous in early spring and has been described as one of the gems of the floral world. In Hawaii the trees are called tigers-claw from the resemblance of the large folded petal. Several varieties are distinguished, the common one being var. *orientalis* (L.) Merr. A variation with spotted or variegated leaflets is grown as an ornamental under glass northward in continental United States.

RANGE.—Native of tropical Asia from India to Philippines, Polynesia, and Australia. Widely planted through the tropics.

OTHER COMMON NAMES.—bucayo, bucayo haitiano, pompón haitiano (Puerto Rico); amapola, mapoleona (Dominican Republic); Indian coralbean, Indian coraltree (English); tigers-claw (Hawaii); bois immortel, arbre à corail (Haiti).

BOTANICAL SYNONYM.—*Erythrina indica* Lam.

382. Frijolillo ***Hebestigma cubense* (H.B.K.) Urban***

This medium-sized deciduous tree native only in Cuba has been introduced in Puerto Rico, where it is rare. It was noted as a small tree 15 feet high but doubtless becomes larger, attaining 40 feet where native. Distinguishing characteristics are: (1) opposite pinnate leaves 6–12 inches long with mostly 7 or 9 leaflets on finely hairy stalks of ¼ inch, paired except at end, ovate, 2–6 inches long and 1–3 inches wide, short- to long-pointed at apex, rounded or slightly notched at base, thin, hairless or nearly so, shiny green above and paler beneath; (2) many showy pale pink pea-shaped flowers ½–¾ inch long on slender stalks along an axis of 3½–6 inches (raceme), composed of cuplike 5-toothed calyx, 5 petals including rounded standard and narrow wings and keel, 9 stamens in a tube and 1 separate, and stalked pistil with narrow ovary and slender style and hairy stigma; and (3) large hard flattened blackish pod 4–8 inches long and ¾–1⅜ inches wide, containing few elliptic blackish seeds ¾ inch long. Collected with flowers in March and with fruits in September and October but not observed by the authors. This tree merits further testing as an ornamental. Classed as a honey plant. OTHER COMMON NAMES.—frijolillo, guamá piñón, piñón de costa, juravaina (Cuba).

381. Bucare, immortelle *Erythrina variegata* L.*

Leafy twig and flowers (above), fruit (below), two-thirds natural size.

383. Geno-geno ***Lonchocarpus domingensis*** **(Turp.) DC.**

A spreading tree of southern and western Puerto Rico recognized by: (1) alternate pinnate leaves with 7–11 elliptic leaflets mostly short-pointed at both ends, paired except at end; (2) pale rose-violet pea-shaped flowers about 5/8 inch long, in long narrow lateral clusters; and (3) brown pod 2–6 inches long and 5/8–7/8 inch wide, flat but hard or leathery, often narrowed between the seeds.

A deciduous tree to 70 feet high and 20 inches in trunk diameter. The bark is brown with whitish dots and fibrous. The young twigs and young leaves are finely brown hairy.

The leaves are 6–10 inches long, the leaflets with stalks 1/8–3/16 inch long. Leaflet blades are 2–5 inches long and 1 1/4–2 1/2 inches wide, mostly short-pointed at both ends but sometimes long-pointed at apex and rounded at base, not toothed on edges, slightly thickened, becoming nearly hairless.

The flower clusters (racemes or panicles) are nearly as long as the leaves, with main axis bearing many flowers on finely hairy stalks about 1/4 inch long, often 2 forking from the same basal stalk. The bell-shaped calyx is 3/16 inch long and broad, finely hairy, minutely toothed at apex; the pale rose-violet corolla sometimes whitish has 5 petals, the rounded standard notched at apex and silky hairy on outside, 2 oblong wings and 2 oblong, hairy, slightly united keel petals; 10 stamens with filaments united; and narrow pistil with short-stalked brown hairy ovary and slender curved style.

The pods usually are finely brown hairy, stalked at base, do not split open, and contain 1 to several flat kidney-shaped dark brown seeds 1/2 inch long. Flowering mostly in spring, also to September, the fruits maturing mostly in summer and persisting.

The wood is whitish or yellowish and strong; in Puerto Rico used chiefly for posts.

A shade and ornamental tree in dry areas and a honey plant. Elsewhere the fibrous bark has been utilized for ropes and cords and the leaves have been employed in home remedies.

Uncommon in southern and western coastal hills at 100–800 feet altitude in southern and western Puerto Rico. Also in Mona and Vieques.

PUBLIC FORESTS.—Guánica, Susúa.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, Guadeloupe, and Martinique.

OTHER COMMON NAMES.—geno (Puerto Rico); anoncillo, anón de majagua, anón de río (Dominican Republic); guamá, guamá de soga, guamá de majagua, guamá de costa (Cuba); savonnette rivière (Guadeloupe, Martinique); savonnette bois (Guadeloupe); bois caïman (Haiti).

BOTANICAL SYNONYM.—*Lonchocarpus sericeus* (Poir.) DC. var. *glabrescens* Benth.

383. Geno-geno *Lonchocarpus domingensis* (Pers.) DC.

Fruits (upper right), flowering twig (below), two-thirds natural size.

384. Geno ***Lonchocarpus glaucifolius* Urban**

Geno, a tree known only from limestone forests of northwestern Puerto Rico, is identified by: (1) alternate pinnate leaves with usually 7, sometimes 5, elliptic to obovate leaflets with blunt slightly notched apex, whitish green beneath; (2) showy pinkish purple pea-shaped flowers ⅝ inch long, several in slender-stalked clusters at leaf bases; and (3) flat brown pods 2–5½ inches long and ½–¾ inch wide, slightly thickened, not narrowed between the several flat beanlike seeds, not splitting open.

Evergreen tree to 30 feet high and 6 inches in trunk diameter. Bark gray or brown, smoothish, the inner bark whitish, fibrous, and slightly bitter. The twigs are brown with light, raised dots (lenticels), finely hairy when young but becoming hairless.

The alternate pinnate leaves are 6–9 inches long, hairless, and have a very slender light green axis and paired triangular hairy stipules 1/16 inch long. The leaflets, usually 7, sometimes 5, are paired except at end, on stalks ⅛ inch long. Leaflet blades are 1½–4 inches long, ¾–1½ inches wide, short-pointed at base, minutely wavy at edges, slightly thick and stiff, the upper surface green and slightly shiny, the lower surface dull whitish green, the slightly curved side veins forming a fine network upon drying.

Flower clusters (panicles) about 2 inches long at leaf bases bear several flowers on slender stalks about ¼ inch long, often paired. The pea-shaped flowers have a cup-shaped 5-toothed finely hairy calyx 3/16 inch long; pinkish-purple corolla of 5 stalked spreading petals about ⅝ inch long, the rounded standard notched at apex and finely brown hairy on outside, 2 oblong wings, and 2 forming the keel; 10 stamens with filaments united, 1 nearly separate; and pistil with narrow hairy ovary and curved style. The pods with calyx at base are abruptly pointed at both ends, minutely hairy. The flat blackish kidney-shaped seeds are about 5/16 inch long. Flowering mainly in late spring, sometimes in winter and summer. Fruits maturing mostly in summer and persisting.

The whitish wood is hard. The strong fibrous bark reportedly has been used as cordage.

Locally abundant in the moist limestone forest at 200–800 feet altitude in northwestern Puerto Rico. Scattered to common on ridges and cliffs.

PUBLIC FORESTS.—Cambalache, Guajataca, Río Abajo.

RANGE.—Known only from northwestern Puerto Rico.

The specific name refers to the glaucous leaves, whitish on lower surface.

384. Geno *Lonchocarpus glaucifolius* Urban

Leaf (left), flowers (upper right), fruits (lower right), natural size.

385. Escambrón ***Machaerium lunatum* (L. f.) Ducke**

Escambrón, a spiny climbing shrub or small tree uncommon in coastal thickets, is easily recognized by: (1) climbing branches with paired curved brown spines (stipules) 1/8–3/8 inch long; (2) pinnate leaves with 5–11 oblong leaflets; (3) many small purplish pea-shaped flowers 3/8 inch long; and (4) the distinctive thick flattened gray pods curved into a circle 1–1½ inches in diameter.

Evergreen climbing shrub 15 feet high with many trunks, sometimes a small tree 20–25 feet high and 8 inches in diameter. With arching, climbing, and spreading spiny branches, the plants form impenetrable thickets along coasts. Young twigs finely hairy.

The alternate leaves 2–4 inches long have slender finely hairy petiole and axis 1–2½ inches long. Paired sharp spines develop from stipules at the base of each leaf and persist on twigs and branches. The leaflets are alternate on slender hairy stalks 1/16 inch long. Leaflet blades are oblong, or the end one obovate, 3/4–2 inches long and 3/8–3/4 inch wide, thin, rounded at both ends or short-pointed at base, not toothed at edges, with many fine parallel side veins, the upper surface green and hairless, and the lower surface light green with minute hairs.

Flower clusters (panicles) at ends and sides of twigs are 2½–6 inches long, with finely hairy branches. Flowers many, short-stalked, irregular and pea-shaped, consisting of hairy bell-shaped 5-toothed calyx 3/16 inch long; 5 purplish petals about 5/16 inch long and stalked at base, the rounded standard curved back, 2 wings, and 2 curved keel petals united at end; 10 stamens nearly ½ inch long, united into a tube about ⅔ their length; and stalked curved pistil nearly ½ inch long with narrow flat hairy 1-celled 1-ovuled ovary and slender style.

The thick leathery pods 3/4 inch wide are curved into a circle 1–1½ inches in diameter and 3/16 inch thick. They do not split open and contain 1 flat kidney-shaped seed 3/4 inch long. With flowers and fruits irregularly through the year.

Locally common in coastal swamps, forming thickets in and near mangrove swamp forests at sea level, mostly in eastern Puerto Rico, also at the western end near Mayaguez. Commonly a shrub but recorded as a slender tree 25 feet high in the wet forest north of Playa de Humacao. Also in Vieques, St. Croix, and St. Thomas.

PUBLIC FORESTS.—Aguirre, Boquerón, San Juan.

This species is abundant over large swampy coastal areas of northern South America, especially in Guyana and Surinam, where it produces extensive thickets.

RANGE.—Hispaniola, Puerto Rico, Vieques, St. Thomas, St. Croix, and from Guadeloupe and Dominica to Trinidad and Tobago. Continental tropical America in southern Mexico, British Honduras, and Guatemala and from Panama to Venezuela, Guianas, Brazil, and Peru. Also tropical Africa.

OTHER COMMON NAMES.—palo de hoz (Puerto Rico); cambrón, escambrón (Dominican Republic); aturiá (Peru); bundari (Guyana); mangle piquant, croc chien (Martinique).

BOTANICAL SYNONYM.—*Drepanocarpus lunatus* (L. f.) G. F. W. Meyer.

The specific name refers to the moon-shaped pods.

386. Cereipo ***Myrospermum frutescens* Jacq.***

This rare planted deciduous tree 20 feet high and 4 inches in trunk diameter, becoming larger, is identified by: (1) alternate pinnate leaves 4–8 inches long with 11–17 alternate short-stalked oblong or elliptic thin leaflets 5/8–3/4 inch wide, rounded or notched at apex, dull green above and paler beneath, easily distinguished by the lines and dots visible with a lens against the light; (2) showy whitish masses of flower clusters (racemes) 3–4 inches long at or near ends of twigs bearing several pea-shaped flowers 5/8 inch long, with 5 white petals and 10 separate stamens; and (3) distinctive yellowish flattened pods 2–2½ inches long with 1 seed at apex and large wing tapering to base. This species might serve for ornament and timber in dry areas, as the hard heavy durable wood has been used elsewhere. First collected in Puerto Rico near Peñuelas by P. Sintenis in 1886. Recorded by Britton and Wilson (*10;* 5: 384) from roadsides and woodlands in Puerto Rico, spontaneous after cultivation and naturalized. Now unknown outside cultivation in Puerto Rico and not collected by the authors. Long ago reported from St. Thomas and St. Croix but not observed there in recent years. RANGE.—Native from southern Mexico and Guatemala to Colombia, Venezuela, and Trinidad. OTHER COMMON NAMES.—cereipo (Spanish); cuerillo (Mexico); guayacán (El Salvador); chiriquirín (Nicaragua); arco (Costa Rica); balsamito, ramoncillo (Colombia); guatamare, macagua, pui (Venezuela); wattama (Trinidad).

385. Escambrón *Machaerium lunatum* (L. f.) Ducke

Leafy twig (above), fruiting twig (below), natural size.

387. Ventura, dogwood ***Piscidia carthagenensis* Jacq.**

This medium-sized tree of dry coastal areas is characterized by: (1) pinnate leaves with usually 7 or 9 elliptic leaflets 2–4 inches long, beneath gray green and finely hairy; (2) the large branched clusters of pinkish pea-shaped flowers about 5/8 inch long; and (3) the distinctive light brown pod 2–4 inches long with 4 longitudinal membranous wings mostly more than 1 inch across.

A deciduous tree becoming 35 feet high and 1 foot in trunk diameter, with smooth gray thick bark. The inner bark is light yellow, streaked with tan, and bitter. Twigs are gray green, finely hairy, becoming gray brown with whitish dots and dashes (lenticels). The pointed buds 1/4 inch or less in length are covered by paired broad hairy scales (stipules), which shed very early, leaving scars at leaf bases.

The alternate pinnate leaves are about 7–12 inches long. The slender, finely hairy, gray-green leaf axis is enlarged at the base and bears usually 7 or 9 (5–11) leaflets, paired except at end, each with a stalk 1/4 inch long. Leaflet blades are elliptic, mostly 2–4 inches long and 1 1/4–2 inches wide, sometimes larger, thin, with apex narrowed into a minute point, rounded base, border straight or slightly wavy, the upper surface dark green, hairless and slightly shiny with many nearly straight parallel lateral veins, and the lower surface dull gray green and finely hairy.

Flower clusters (panicles), often before the leaves, are lateral, branched, 3–12 inches long, and bear many flowers on slender stalks. The pea-shaped flower is composed of bell-shaped purplish or pinkish hairy calyx 3/16 inch long, slightly 5-toothed and finely hairy; corolla of 5 unequal pale pinkish petals about 5/8 inch long, finely hairy, consisting of the broad rounded spreading standard, 2 narrow wings, and 2 united and forming the curved keel; 10 curved stamens within keel and united into a narrow tube; and pistil consisting of narrow greenish hairy 1-celled ovary and slender bent style.

The fruit is an odd-shaped pod composed of long stalk above the calyx at base, slender body, and 4 longitudinal, broad membranous or paper wings about 1/2 inch wide. It contains several oblong bean-shaped dull brown seeds 1/4 inch long but does not split open. Flowering from February to June, the fruits maturing in early summer and persistent.

The wood is described as hard, heavy, tough, and strong, the sapwood whitish and heartwood yellowish brown. Elsewhere the wood of related species has served for boatbuilding, vehicle construction, posts, and charcoal.

Indians, including Caribs in the West Indies, threw the root bark, young branches, and powdered leaves of this and related species into the water to aid in catching fish. The fish are stupefied, rise to the surface, and float but recover if not caught. This use is indicated in the English common name and the generic name. The bark of this and related species has served also in home remedies. The trees sometimes are grown in fences as ornamentals.

Locally common in thickets along coast and in coastal hills from sea level to 700 feet altitude in southern and eastern Puerto Rico. Also all larger islands eastward including Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Aguirre, Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands, through Lesser Antilles from St. Martin and St. Barts to Barbados, Grenada, and Tobago. Also, along coasts of Venezuela, Colombia, Ecuador, northwestern Peru, and Galápagos Islands. Also from Panama northwest along Pacific coast through Central America to southern and western Mexico.

OTHER COMMON NAMES.—barbasco (Spanish); cahuirica, frijolillo, tatzungo (Mexico); matapez (Mexico, Colombia); zopilocuavo (El Salvador); cachimbo (Costa Rica); arepo, jebe, barbasco amarillo, baurá (Colombia); cuchiván (Venezuela); dogwood, fishpoison-tree (English); bois à énivrer, énivrage (Martinique); dogwood, stinkwood (St. Eustatius, St. Martin).

BOTANICAL SYNONYMS.—*Piscidia acuminata* (Blake) I. M. Johnst., *Ichythyomethia acuminata* Blake, *I. piscipula* var. *acuminata* (Blake) Stehlé & Quentin.

Referred by Britton and Wilson (*10*) to the related species Florida fishpoison-tree, *Piscidia piscipula* (L.) Sarg. (*Ichthyomethia piscipula* (L.) Hitchc.), of Florida, Bahamas, Cuba, Jamaica, Hispaniola, and from eastern Mexico to British Honduras, Guatemala, and coastal islands of northern Honduras. That species has smaller flowers about 1/2 inch long with calyx bluntly lobed.

387. Ventura, dogwood

Piscidia carthagenensis Jacq.

Leafy twig (above), fruit and flowers (lower right), natural size.

388. Pterocarpus, Burma padauk ***Pterocarpus macrocarpus* Kurz***

This exotic ornamental, shade, and timber tree is identified by: (1) long drooping branches; (2) reddish latex; (3) pinnate leaves alternate in 2 rows with usually 7–11 oblong to ovate thin shiny green leaflets borne singly, short-pointed at apex; (4) showy yellow pea-shaped flowers 5/8 inch long profusely borne in lateral clusters; and (5) nearly round flat light brown pod 2–2 3/4 inches in diameter, bordered by a broad membranous wing, stalked at base and with minute pointed style at one side. It differs from the related species No. 89, India padauk (*Pterocarpus indicus* Willd.*), in the larger pods and the shorter-pointed mostly oblong leaflets.

A large spreading tree becoming 80 feet tall and 2 1/2 feet in trunk diameter with small buttresses and with broad dense crown of long branches, some nearly touching the ground. The light brown bark is slightly furrowed and a little rough and shaggy. Inner bark is streaked reddish brown and light brown, astringent, and produces a small amount of reddish sticky bitter latex. The green twigs minutely hairy at apex bear 2 rows of slightly drooping leaves. The trees are almost evergreen but with few leaves for a short period in spring when old leaves fall and young leaves develop.

The leaves 9–16 inches long have 7–11 leaflets borne singly along a light green axis enlarged at base. Flowering branches often have fewer leaflets, sometimes only 5–1. Leaflets on stalks about 5/16 inch long have oblong to ovate blades (or the lowest nearly round) 2 1/2–5 inches long and 2–3 inches wide, sometimes larger, short-pointed at apex and broadly pointed to nearly straight at base, not toothed on edges, turned up at midrib, slightly shiny green above, and dull light green beneath.

Flower clusters (mostly panicles or racemes) 3–8 inches long bear several to many fragrant flowers on slender green stalks. Flowers are about 5/8 inch long, with green bell-shaped finely hairy calyx 5/16 inch long, unequally 5-toothed; 5 yellow petals 5/8 inch or less in length, becoming crinkled, including nearly round standard more than 1/2 inch long and rolled back, 2 wings, and 2 smaller keel petals united a little at sides; 10 stamens nearly 3/8 inch long, the whitish filaments united toward base; and greenish hairy pistil 7/16 inch long, with stalked narrow 1-celled ovary and tapering style.

The odd fruits, yellow green when immature, turning to light brown, have a roughened central body with raised veins containing 2–4, usually 3, seeds but not opening to release them. The narrow curved brown seeds are less than 1/2 inch long. At the base are remains of calyx and a stalk about 3/8 inch long. Recorded in flower in June and July and in fruit in August and in January and February.

The wood is light brown and hard. Reported to be an important timber tree of Burma and a valuable cabinetwood.

Sparingly planted in Puerto Rico for ornament and shade, having been introduced about 1923. Its use for these purposes is increasing, and it might become very popular. The shade of the foliage is so dense that grass does not grow beneath the crown of a large tree.

A splendid ornamental in south Florida, flowering several times a year.

RANGE.—Native of southern Asia from Burma to Indochina.

OTHER COMMON NAME.—Burma padauk (English).

388. Pterocarpus, Burma padauk *Pterocarpus macrocarpus* Kurz*

Flowers (upper left), leafy twig (center), fruits (lower right), two-thirds natural size.

389. Retama, wattapania ***Sabinea florida*** **(Vahl) DC.**

Retama or wattapania, on back cover, is a handsome shrub or small tree with wandlike branches. It is recognized by: (1) pinnate leaves 2–4 inches long, with mostly 8–20 pairs of oblong or elliptic leaflets ¼–⅝ inch long and ⅛–¼ inch wide, bristle-tipped, and nearly stalkless; (2) many showy pale purple pea-shaped flowers about ⅞ inch long and 1¼ inches across, usually clustered along old unbranched twigs when leafless; and (3)dark brown very narrow pod 3–4 inches long and ¼ inch wide, flattened, and twisting when splitting open.

A deciduous shrub or small tree 12–20 feet tall with trunk 2–4 inches in diameter, sometimes to 40 feet high with trunk to 8 inches, with long slender spreading branches. The bark is gray and fissured, the inner bark whitish and tasteless. The twigs are brown and finely hairy.

Though borne singly or alternate, the leaves on very short lateral twigs may appear to be paired or more numerous at a node. There are 2 brown narrow scales (stipules) 3/16 inch long at base. The slender green axis is minutely hairy and ends in a tiny point beyond last pair of leaflets. Leaflets are rounded at both ends with minute bristle tip at apex, thin, dark green and hairless above, and beneath pale green and finely hairy or hairless.

Flowers have slender stalks ¼–½ inch long, sometimes single. The bell-shaped purple calyx is 3/16 inch long and minutely 5-toothed; the 5 pale purple, lavender, or blue petals nearly ⅞ inch long and stalked at base, consisting of broad rounded standard, 2 wings, and 2 slightly united keel petals; 10 white stamens, 9 united into a tube near base and 1 separate, 5 half as long as others; and pistil with stalked narrow ovary and long curved reddish purple style. The pod is stalked at base and pointed at both ends. Seeds several, elliptic, flat, ⅛ inch long. In flower mostly from January to March and with mature fruits in spring and summer.

The whitish wood is hard.

When in flower the entire plant is a mass of bluish purple. Perhaps the most spectacular species in the flora of Tortola, according to D'Arcy (*17*). A small tree with white flowers near Aibonito was recorded by Britton and Wilson (*10*). N. L. Britton classed this as one of the most elegant of endemic species in the region.

Sparingly planted as an ornamental for the masses of beautiful flowers which are very conspicuous along the leafless branches but soon shedding. Certainly worthy of wider cultivation.

Locally common in moist coastal, moist limestone, and lower Cordillera forests at 100–2,500 feet altitude in northern Puerto Rico. Also in Culebra, Vieques, St. Thomas, St. John, Tortola, and Virgin Gorda. Originally named and described botanically from St. Thomas in 1793.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Luquillo,* Maricao, Río Abajo, Susúa, Vega; Virgin Islands, Sage Mountain, Gorda Peak.

RANGE.—Puerto Rico and Virgin Islands.

OTHER COMMON NAMES.—San José (Puerto Rico); wattapama (Virgin Islands).

The genus *Sabinea* contains only 3 species. Caracolillo, *Sabinia punicea* Urban, is a shrub with dark red to pink flowers, known only from moist parts of central and western Puerto Rico. The third, carinalia, *S. carinalis* Griseb., is a shrub with scarlet flowers confined to the island of Dominica. The generic name honors Joseph Sabine (1770–1837), British botanist. Related to the locusts, genus *Robinia*, of continental United States.

389. Retama, wattapania

Sabinea florida (Vahl) DC.

Flowers (left), leafy twig (upper right), fruits (lower right), natural size.

Herbs and shrubs, rarely trees (*Averrhoa*), known by: (1) sour sap; (2) leaves alternate, pinnately or palmately compound or rarely simple, entire, without stipules; (3) flowers in clusters (like umbels or cymes) or solitary, bisexual, regular, the calyx of 5 sepals, corolla of 5 petals sometimes united at base, 10 stamens (or 5 reduced to staminodes) in 2 series, and pistil composed of superior 5-celled ovary with axile placentation and 1 or more ovules in each cell, and 5 separate persistent styles with dot-like stigmas; and (4) fruit a columnar 5-angled 5-celled capsule with many seeds, sometimes with covering (aril).

390. Carambola ***Averrhoa carambola* L.***

Carambola is rarely planted for its odd, very sour, juicy, yellow fruits 2½–4 inches long and 1½–2 inches broad, oblong and sharply 5-angled. Other characters for identification are: (1) pinnate leaves with 7, 9, or 11 ovate leaflets mostly paired except at end, spreading in 2 rows on long twigs; and (2) small purplish 5-parted bell-shaped flowers ⅜ inch long and broad, many on dark red branched stalks at leaf bases and on branches.

Evergreen small tree becoming 25 feet high, with a few trunks from base to 6 inches in diameter. The bark is light brown, smoothish to slightly cracked, the inner bark pink brown, fibrous and tasteless. The long branches are light brown and smooth. Twigs are brown and finely hairy when young, ending in a minute hairy leaf.

The alternate pinnate leaves nearly horizontal in 2 rows are 6–10 inches long including the slender light green or pinkish axis and 7, 9, or 11 drooping leaflets. The leaflets have short stalks ⅛ inch long and fold together in pairs at night. Blades are 1–4 inches long and ¾–1¾ inches wide, the lowest being smallest and end one largest. They are short-pointed at apex, rounded but unequal at base, not toothed at edges, thin, slightly curved up from midvein, with few inconspicuous side veins, nearly hairless, the upper surface green and slightly shiny, and the lower surface dull light green.

Flower clusters (panicles) 1–2 inches long at base of older leaves and back of leaves bear many flowers on short slender dark red stalks. The flower consists of 5 oblong pink sepals rounded to wavy at apex; corolla of 5 spreading purple petals nearly ¼ inch long, slightly united by edges near base; 5 stamens alternate with petals and 5 smaller sterile stamens; and pistil with deeply 5-angled 5-celled ovary and 5 slender styles pressed together.

The heavy berries hang down in groups or singly from slender stalks along the twigs, bending down the twigs and branches by their weight. The shape is deeply 5-angled and grooved (star-shaped in cross section), narrowed to 5 blunt points at apex, slightly notched at base. Color changes from yellow-green to yellow and orange yellow. The thick light yellow flesh is soft, juicy, and sour. There are 5 small cells and several brown flat seeds ⅜–½ inch long with yellow flesh (aril) at end. The fruits do not open but fall to the ground, maturing from July to September.

The sour fruits are eaten raw and used for marmalade and pickles. The flavor becomes less acid and more pleasant at maturity. Leaves and fruits have served in home remedies.

The wood is whitish and soft.

Carambola is rarely cultivated in Puerto Rico and the Virgin Islands for the edible fruits. It is also a handsome ornamental.

RANGE.—Native of tropical Asia but widely planted through the tropics. Sometimes grown in southern Florida and southern California.

OTHER COMMON NAMES.—carambola (Spanish, English, Portuguese); vinagrillo (Dominican Republic); pepino de la India (El Salvador); zibline (Haiti).

390. Jalea, carambola *Averrhoa carambola* L.*

Fruit (left), and flowering twig, two-thirds natural size.

COCA FAMILY (ERYTHROXYLACEAE)

Shrubs and small trees, known by: (1) alternate simple leaves entire to wavy-toothed, hairless, often with 1 pale line on each side of midvein (from folds in bud), with minute pointed stipule in the angle above the petiole like a bud; (2) minute inconspicuous flowers 1 or several at base of leaves, bisexual, regular, in form of bell or wheel, with persistent calyx of 5 sepals or lobes, 5 small petals with 2 minute lobes within, 10 stamens in 2 series united into short tube toward base, and pistil with superior 3-celled ovary, 1 cell developing with 1–2 ovules, and 3 styles; and (3) fruit a reddish berrylike drupe, sour, 1-seeded. Also vol. 1, p. 210.

Key to species

A. Leaves mostly 2–4 inches long.
  B. Leaves thin, with 2 faint lines nearly parallel with midrib, dull dark green above, and pale whitish green beneath—92. Indio, *Erythroxylum areolatum* L.
  BB. Leaves slightly thickened, without faint lines, shiny dark green above with network of veins when dry, and beneath paler and slightly rusty tinged—392. *Erythroxylum rufum.*
AA. Leaves mostly less than 1½ inches long.
  C. Leaves thin, rounded or notched at apex, dull green to dark green above—391. *Erythroxylum rotundifolium.*
  CC. Leaves thick and stiff, notched at apex, slightly shiny green above, with network of veins when dry—393. *Erythroxylum urbanii.*

391. Rocío, brisselet — *Erythroxylum rotundifolium* Lunan

This common shrub or small tree widespread at low altitudes is identified by: (1) small obovate to rounded thin leaves ¼–1½ inches long and ¼–¾ inch wide, alternate and crowded along short side twigs; (2) small whitish flowers about ¼ inch across, 1–4 short stalks at leaf bases; and (3) oblong shiny dark red fleshy fruits ¼ inch long.

Deciduous shrub or sometimes a small tree to 25 feet high and 4 inches in trunk diameter, hairless throughout. Bark gray or light brown, smooth, becoming finely fissured, the inner bark pinkish and slightly bitter. The gray twigs are much branched, often regularly, some long and slender and many short spurs, roughened by persistent stipules.

The leaves have slender leafstalks 1/16–3/16 inch long. The pointed stipules 1/16 inch long inserted 1 above leaf base form the buds and persist as crowded scales on the short side twigs. Blades are rounded or slightly notched at apex, short-pointed at base, thin, dull green to dark green on upper surface, and light green beneath.

The flowers have a slender stalk less than ⅛ inch long, 5-toothed calyx, 5 white petals ⅛ inch long with 2 lobes (ligules) near middle of inner side, 10 stamens united into a tube toward base, and pistil with ovary and 3 styles. The fleshy fruit (drupe) has calyx persistent at base and becomes dry and brown. Flowering in summer and maturing fruits in late summer.

The wood is light brown or whitish and hard.

The fragrant flowers are attractive to bees.

Common to abundant in open areas from sea level to 2,500 feet altitude nearly throughout Puerto Rico except in upper Cordillera and upper Luquillo forests and through the islands eastward. Also Desecheo, Muertos, Isla Piñeros, Vieques, Culebra, St. Croix and Buck Island, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Aguirre, Cambalache, Guajataca, Guánica, Maricao, Río Abajo, San Juan, Susúa, Vega, Estate Thomas; Buck Island Reef, Virgin Islands, Sage Mountain.

RANGE.—Bahamas, Greater Antilles, Virgin Islands, St. Martin, St. Barts, and Guadeloupe. Recorded from Curacao.

OTHER COMMON NAMES.—jiba, ratón (Puerto Rico); brisselet (Virgin Islands); yaría de costa (Cuba); bois vinette, brésillette (Martinique).

BOTANICAL SYNONYM.—*Erythroxylum brevipes* DC. The generic name has been spelled also *Erythroxylon.*

391. Rocío, brisselet *Erythroxylum rotundifolium* Lunan

Flowering twig (above), fruiting twig (below), natural size.

392. ***Erythroxylum rufum*** **Cav.**

This rare small tree of western Puerto Rico is identified by: (1) elliptic to obovate leaves with large notch at the rounded apex; (2) small 5-parted flowers about 1/4 inch across on slender stalks at leaf bases; and (3) oblong red fleshy fruits 1/2–5/8 inch long.

Evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, with horizontal branches, hairless throughout. Bark gray, smooth to slightly fissured. Twigs brown, with raised dots (lenticels), ending in pointed bud 1/4 inch long formed by stipules.

Leaves alternate, mostly on short side twigs. Stipule a pointed scale 3/16 inch long inserted above base of slender leafstalk 1/4–3/8 inch long and often persistent on twig back of leaves. Blades 1 1/2–4 inches long, and 1–2 1/4 inches wide, with large notch at rounded apex, short-pointed at base, slightly thickened and turned under at edges, the upper surface shiny dark green, with network of veins when dry, the lower surface dull, paler and slightly rusty tinged, often with 2 faint lines parallel with midvein.

Flowers few or 1 at leaf bases and back of leaves have slender stalks 1/2–3/4 inch long slightly thickened above, 5-toothed calyx 1/16 inch long, 5 spreading petals 3/16 inch long, 10 stamens united into a tube toward base, and pistil with 3-celled ovary and 3 styles. The fruit (drupe) has calyx at base, thin pulp, and 1 seed. Collected with fruits in June and July.

Rare in moist limestone forest from Vega Baja west and western lower Cordillera forest to 2,500 feet altitude in western Puerto Rico.

PUBLIC FORESTS.—Guajataca, Maricao, Susúa.

RANGE.—Cuba, Hispaniola, Puerto Rico, and Venezuela and Guyana in northern South America.

OTHER COMMON NAMES.—papelillo, topillo (Dominican Republic); miel de pajarito (Venezuela).

392. *Erythroxylum rufum* Cav.

Fruiting twig (above), flowering twig (lower left), natural size.

393. ***Erythroxylum urbanii* O. E. Schulz**

A shrub or small tree of limestone hills of northern and western Puerto Rico, identified by: (1) small obovate or elliptic, thick and stiff leaves ¾–1¾ inches long and ⅜–1 inch wide, notched at apex, in 2 rows on twigs, which also are in 2 rows; (2) small whitish 5-parted flowers 3/16 inch across, single or few and almost stalkless at leaf bases; and (3) oblong orange-red fleshy fruits ⅜ inch long.

Evergreen shrub or sometimes a small tree to 20 feet high and 3 inches in trunk diameter, hairless throughout. Bark gray, becoming fissured. The inner bark is light pink and slightly bitter. Twigs both long and short, the short twigs roughened by crowded persistent stipules.

Leaves alternate in 2 rows but also crowded on short side twigs. Stipule a pointed scale 1/16 inch long ending in 2 bristles, inserted above base of the leafstalk 1/16–⅛ inch long and often persistent. The blades are short-pointed at base, thick and stiff, slightly bent up at midvein and turned under at edges, the upper surface slightly green, with network of veins when dry, and the lower surface dull light green.

The flowers on stalks 1/16 inch long are composed of greenish 5-toothed calyx, 5 spreading white petals ⅛ inch long with 2 lobes (ligules) near middle of inner side, 10 stamens united into a tube toward base, and pistil with ovary and 3 short styles. The fruit (drupe) has calyx at base, juicy orange pulp and 1 oblong yellowish seed ¼ inch long. With flowers in spring and summer and with fruits in August.

The wood is light brown and hard.

Uncommon and local in moist limestone and western lower Cordillera forests at 300–2,500 feet altitude in northern and western Puerto Rico. Discovered near Manatí and collected afterwards near Vega Baja.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Puerto Rico and Hispaniola (Haiti and Dominican Republic).

The specific name honors Ignatz Urban (1848-1931), German botanist and author of a flora of Puerto Rico and similar volumes on other islands of the West Indies.

CALTROP FAMILY (ZYGOPHYLLACEAE)

Mostly shrubs, also herbs and few trees, known by: (1) twigs with rings at enlarged nodes; (2) opposite even pinnate leaves, the leaflets asymmetrical with unequal sides, entire, often leathery, with paired stipules; (3) flowers solitary or few, bisexual, regular, generally with 5 sepals and 5 yellow or blue petals, usually with disk, 5–10 (15) stamens often with scales at base, and pistil composed of superior 4–5 celled ovary usually angled or winged, with 2 to many ovules in each cell, and style; and (4) fruit usually an angled or winged capsule with few seeds. Vol. 1, p. 212.

Key to species (Nos. 93–94)

A. Leaflets mostly 4, sometimes 6; fruits mostly flattened, heart-shaped at apex—93. Guayacán, common lignumvitae, *Guaiacum officinale* L.

AA. Leaflets mostly 6–10; fruits deeply 5- or 4-angled or winged, pointed at apex—94. Guayacán blanco, holywood lignumvitae, *Guaiacum sanctum* L.

393. *Erythroxylum urbanii* O. E. Schulz

Twig with flowers and immature fruits (left), flowering twig (upper right), fruiting twig (lower right), natural size.

RUE FAMILY (RUTACEAE)

Shrubs and trees, rarely herbs, known by: (1) leaves, fruits, and bark aromatic with pungent citrus odor; (2) leaves simple, pinnate, or digitate, with gland dots, generally hairless, without stipules; (3) flowers usually regular, mostly white or greenish, small to large and showy, commonly bisexual, sometimes male and female on different plants (dioecious), generally with 5–4 sepals and 5–4 petals, 8–10 (3 to many) stamens, generally 1 pistil on a disk with superior deeply lobed ovary usually 5–4-celled with 1 or more ovules in each cell, and 5–1 styles; and (4) fruit generally a capsule or berry, sometimes a drupe, follicle, or winged (samara). Also vol. 1, p. 216.

Key to species

A. Leaves opposite.
  B. Leaves simple, stalkless, elliptic to ovate, short-pointed, 2–6 inches long—401. *Ravenia urbanii.*
  BB. Leaves compound with usually 3 long-pointed leaflets or pinnate with 5 or 7—*Amyris.*
    C. Leaflets mostly 3; fruit round, ¼ inch long; hairless or nearly so; widely distributed—95. Tea, sea amyris, *Amyris elemifera* L.
    CC. Leaflets 3–7; fruit elliptic, ¼–½ inch long; stiff hairs on flower clusters, calyx, and ovary; very rare—394. *Amyris balsamifera.*
AA. Leaves alternate.
  D. Leaves simple.
    E. Leaves with margin not toothed, sometimes slightly wavy, petiole not jointed with blade; flowers and fruit very small, about 3/16 inch long—103. Palo rubio, yellow-prickle, yellow prickly-ash, *Zanthoxylum monophyllum* (Lam.) P. Wilson.
    EE. Leaves with many rounded teeth on margin, petiole usually jointed with blade; flowers very large, white; fruit a rounded or elliptic juicy berry (citrus)—*Citrus.*
      F. Leaves small, mostly 1½–3 inches long; fruit less than 2½ inches long.
        G. Petioles ¼–⅜ inch long, not winged; fruit deep orange or reddish orange, rounded but much flattened, 2–3 inches in diameter, with thin loose peel (mandarin orange)—397. *Citrus reticulata.**
        GG. Petioles ⅜–¾ inch long, narrowly winged; fruit elliptic, green, yellow, or orange, 1½–2½ inches long (lime)—96. Limón agrio, lime, *Citrus aurantifolia* (L.) Swingle.*
      FF. Leaves and fruit larger.
        H. Petiole wingless or narrowly winged.
          I. Petiole wingless or nearly so.
            J. Petiole less than ¼ inch long; fruit oblong or elliptic, yellowish or greenish, with very thick whitish peel and small bitter pulp (citron)—396. *Citrus medica.**
            JJ. Petiole almost wingless, ¼–½ inch long; fruit elliptic, blunt-pointed or tubercled at both ends, the surface often rough and wrinkled, yellow (lemon)—98. Limón de cabro, lemon, *Citrus limon* (L.) Burm. f.*
          II. Petiole narrowly winged, ⅜–¾ inch long; fruit round, smooth, orange (sweet orange)—100. China, sweet orange, *Citrus sinensis* Osbeck.*
        HH. Petiole broadly winged.
          K. Leaves mostly long-pointed at apex; fruit round, roughened, orange, bitter, inedible (sour orange)—97. Naranja agria, sour orange, *Citrus aurantium* L.*
          KK. Leaves rounded at both ends (or blunt-pointed at apex); fruit round, smooth, large.
            L. Petiole elliptic; fruit 3½–5 inches in diameter (grapefruit)—99. Toronja, grapefruit, *Citrus paradisi* Macfadyen.*
            LL. Petiole heart-shaped; fruit 5–6 inches in diameter, round or slightly pear-shaped, with thick peel (pummelo)—395. *Citrus grandis.**
  DD. Leaves compound.
    M. Leaves palmately compound (digitate) with usually 3 leaflets.
      N. Leaflets 3, ovate, ½–1½ inches long, with finely wavy edges and slightly notched or rounded at apex—402. *Triphasia trifolia.**
      NN. Leaflets usually 3 (1–5), large, elliptic, 2–6 inches long, turned under at edges—400. *Pilocarpus racemosus.*
    MM. Leaves pinnate (leaflets only 2 in No. 403 and sometimes in No. 405).
      O. Leaflets 3–9, elliptic to obovate, ½–1½ inches long, finely wavy toothed; fruit (berry) elliptic or egg-shaped, ⅜–½ inch long, shiny red—399. *Murraya paniculata.**
      OO. Leaflets mostly 7 to many, sometimes only 3 or 2; fruit a dry blackish capsule—*Zanthoxylum.*
        P. Spines none; leaflets mostly 5–9, elliptic, 1–3 inches long—101. Aceitillo, yellow-sanders, yellowheart, *Zanthoxylum flavum* Vahl.
        PP. Spines on twigs and leaves.
          Q. Leaves very small with mostly 3–7 narrow leaflets ⅛–½ inch long on winged axis; twigs very slender, widely forking, with paired spines at nodes—406. *Zanthoxylum spinifex.*

QQ. Leaves and leaflets larger on axis not winged; twigs mostly stout.
R. Leaflets 2, obovate or spoon-shaped, stiff and thick, turned under at edges, with usually a spine at apex of petiole—403. *Zanthoxylum bifoliolatum.*
RR. Leaflets 3 or more (sometimes 2 in No. 405).
S. Leaflets less than 1 inch long, 5–9, ovate or rounded—407. *Zanthoxylum thomasianum.*
SS. Leaflets more than 1 inch long.
T. Leaflets bordered with coarse wavy teeth, 7–13, elliptic—404. *Zanthoxylum punctatum.*
TT. Leaflets bordered with minute wavy teeth.
U. Leaflets elliptic or obovate, 2–7, commonly 3—405. *Zanthoxylum punctatum.*
UU. Leaflets oblong to lance-shaped, 7–19—102. Espino rubial, white-prickle, Martinique prickly-ash, *Zanthoxylum martinicense* (Lam.) DC.

394. Teílla, balsam amyris — ***Amyris balsamifera* L.**

This aromatic shrub or small tree is related to the common species No. 95, tea, sea amyris, *Amyris elemifera* L., and has been reported from near Guánica, though not found by the authors. Main differences are the fruits slightly larger, elliptic, and often tapering into narrow base instead of round and the ovary densely hairy instead of hairless. Distinguishing characteristics include: (1) opposite compound leaves with mostly 3, sometimes 5 or 7, ovate leaflets 1½–5 inches long and ½–2 inches wide, long-pointed at apex and short-pointed or rounded at base, hairless, with many gland dots and aromatic when crushed; (2) many small whitish flowers with minute 4-lobed bristly hairy calyx, 4 spreading petals 3/16 inch across, 8 stamens, and pistil with stiff hairs on ovary and broad stigma; and (3) many black fruits (drupes) elliptic, ¼–⅝ inch long, often tapering into narrow base. The resinous wood has served elsewhere for torches and production of amyris oil. RANGE.—Southern Florida, Cuba, Jamaica, Hispaniola, Puerto Rico (?), Colombia, and Venezuela. OTHER COMMON NAMES.—guaconejo, palo de teja (Dominican Republic); cuaba, cuaba blanca, cuaba de monte, cuabilla (Cuba); tigua (Venezuela); balsam amyris (United States); torchwood (Jamaica); bois chandelle (Haiti). Specimens of this rare species are desired to verify the occurrence in Puerto Rico.

395. Pomelo, pummelo — ***Citrus grandis* (L.) Osbeck***

This small spiny evergreen tree is related to No. 99, toronja or grapefruit, *C. paradisi* Macfayden,* but has larger smoothish, thick-skinned fruits 5–6½ inches in diameter or slightly pear-shaped, with the juicy particles large and easily separable, and large rough yellowish seeds. The twigs are stout, angular, often hairy. The larger elliptic leaves are 3–6 inches long, 2–3 inches wide, blunt at apex, rounded or slightly heart-shaped at base, wavy-toothed on edges, often hairy on veins, the petiole 1 inch long, broadly winged, heart-shaped, and hairy. Flowers are very large and showy, with 5 sepals, 5 white petals, 20–25 stamens, and pistil with many-celled ovary. The thick fruit peeling has been used in making marmalade. Sparingly planted in Puerto Rico and the Virgin Islands and perhaps escaping from cultivation. RANGE.—Native of southeastern Asia and East Indies but widely planted and naturalized in tropical regions of the world. OTHER COMMON NAMES.—pomelo, pamplemusa (Spanish); pummelo, shaddock (English), chadèque, pamplemousse (French). BOTANICAL SYNONYM.—*C. maxima* (Burm.) Merr.

396. Cidra, citron ***Citrus medica* L.***

Cidra or citron is distinguished from the other citrus fruits by the following characters: (1) large dull green oblong to elliptic leaves with usually rounded apex and short wingless petiole which generally is not jointed with blade; (2) flowers 1½–1¾ inches across, with 5 whitish petals curved inward at tip and purplish tinged on outside; and (3) the large oblong or cylindric yellowish or greenish fruit 5–8 inches long and 3½–6 inches in diameter, blunt-pointed at apex, wrinkled or smooth, with very thick whitish peel or rind 1½–2½ inches thick and scant or dry bitter pulp.

An aromatic evergreen shrub or small tree to 15 feet in height and 3 inches in trunk diameter, with short trunk and long irregular branches. The bark is brown and smoothish, the inner bark light brown and slightly bitter. The green twigs usually have large stout green spines ⅜–1¼ inches long, single at nodes.

The alternate leaves have petioles ⅛–¼ inch long and large oblong to elliptic blades 3–7 inches long and 1¼–2 inches wide, the apex sometimes short-pointed or notched, base rounded or short-pointed, borders with many minute rounded teeth, thick and leathery, with numerous gland dots, dull green above and light green beneath.

The flowers are short compact terminal or lateral clusters (racemes) or 3–10 or sometimes solitary, some bisexual and some male, the buds purplish tinged. The cuplike light green calyx 3/16 inch long is 5-toothed; the 5 spreading oblong petals ¾–1¼ inches long; about 30–40 or more stamens united in lower part into a white tube; and pistil on disk base with green 9–13-celled ovary tapering into the stout yellowish style. The fruit (berry) contains whitish, pointed, elliptic seeds ⅜ inch long in a pale yellow pulp. The rind is firm and slightly bitter. Flowering and fruiting irregularly.

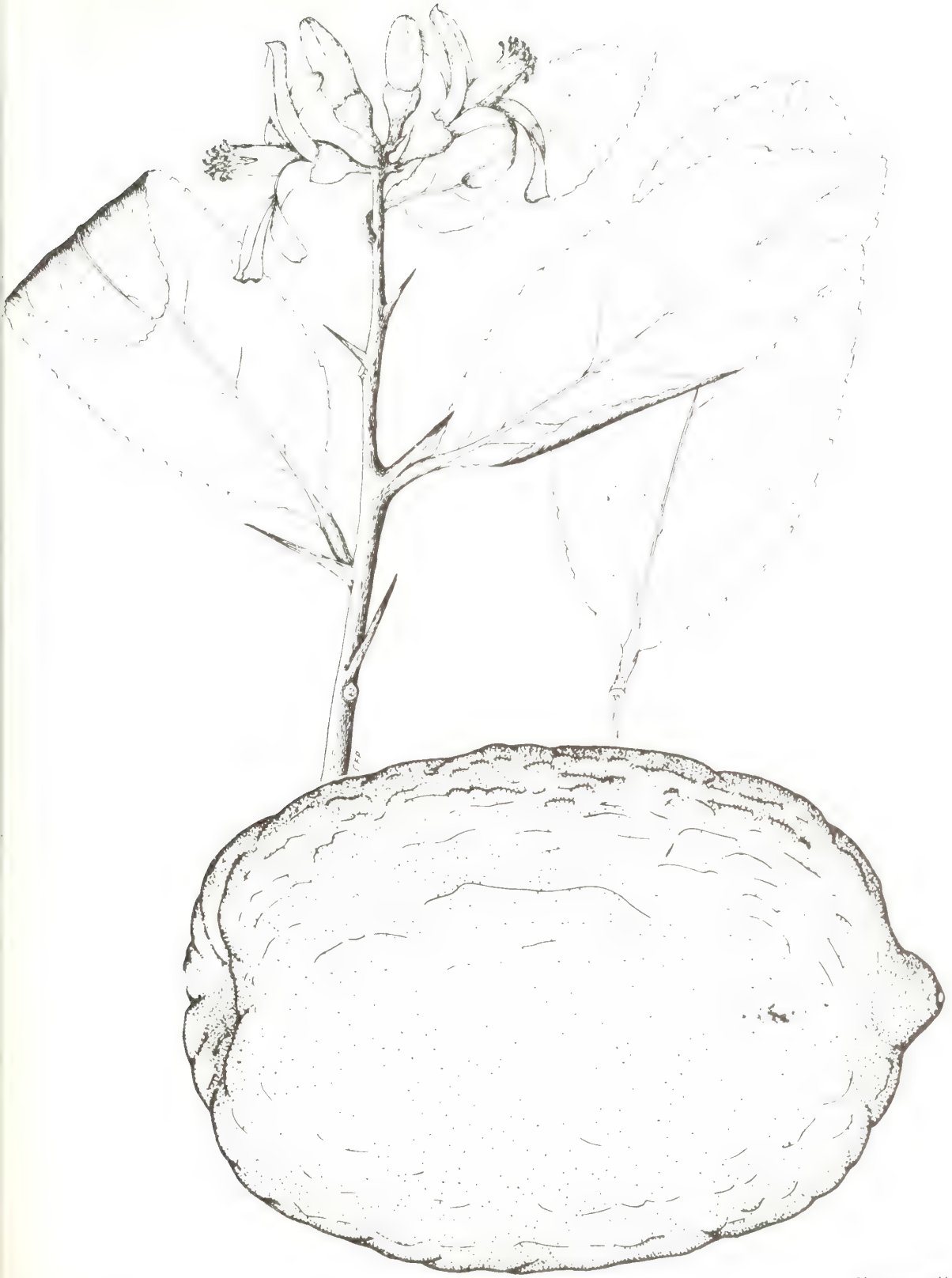
The wood is light brown and hard and not used in Puerto Rico.

The commercial part of the fruit is the thick peel or rind, which is packed in brine for shipment and afterwards candied and made into preserves and confections. The Mediterranean region exports quantities of the rind to the United States and other countries. Citron is more sensitive to cold than related species. The flowers of this and other species of citrus produce nectar in quantities and are an important source of honey.

Citron is grown locally in plantations in Puerto Rico, chiefly near the coast and in the central mountains but is uncommon. Also in St. Croix.

RANGE.—Native home uncertain, possibly Arabia, India, or China. Widely cultivated and naturalized in tropical and subtropical regions, including Florida and West Indies, and from Mexico and Guatemala to Peru and Argentina.

OTHER COMMON NAMES.—cidra (Spanish); cedro limón, cidrero (Mexico); toronja (El Salvador, Nicaragua, Costa Rica); zamboa, cidro (Colombia); limón cedra (Peru); citron (United States, English); citron, citronnier (French); cédrat (Guadeloupe); bois de citronnier, cidreira (French Guiana); citroen (Dutch Antilles).



396. Cidra, citron *Citrus medica* L.

Flowering twig (above), fruit (below), natural size.

397. Mandarina, mandarin orange ***Citrus reticulata* Blanco***

Mandarina or mandarin orange, known also as tangerine is recognized by its aromatic fruit and foliage and is distinguished from other citrus trees by: (1) elliptic to lance-shaped leaves varying from rounded to pointed at both ends, and petiole narrowly margined but not winged; (2) fragrant small white flowers ¾–1 inch across; and (3) the fruit, which is deep orange or reddish orange, rounded but much flattened and sunken at base and apex, 2–3 inches in diameter, with thin skin loose and easily removed, and hollow core of orange or reddish, sweetish acid flesh easily separated into fibrous-walled sections.

A small evergreen tree 15 feet high and 3 inches in trunk diameter. The bark is brown and smoothish, the inner bark pale greenish and yellowish, and bitter. The slender green twigs, angled when young, are spiny or spineless.

Leaves alternate with petioles ¼–⅜ inch long. The blade is 1½–4 inches long and ¾–1¾ inches wide, jointed to petiole, with many minute rounded teeth at edges, slightly leathery and with numerous tiny gland dots, dark green and dull or slightly shiny above and beneath paler. The apex is long-pointed in one variety.

There are 1–4 flowers terminal or at leaf base. The calyx is ⅛ inch long and has 5 pointed lobes turned back; the 5 white petals are about ⅜ inch long; about 20 stamens united at base; and pistil with 8–15-celled ovary, long style, and rounded stigma.

The distinctive fruit of mandarin orange or tangerine is composed of 8–15 sections and has the pulp walls more fibrous than in other species. The many whitish pointed seeds are about 5/16 inch long, not noticeably flattened. Flowering in spring and maturing fruits in winter.

The whitish hard wood is not used.

A few races of this species occasionally are planted as fruit trees through the moist areas of Puerto Rico. Classed also as an ornamental of graceful form and fine foliage in southern Florida.

RANGE.—Native of Philippines and southeastern Asia. Widely planted in tropical and subtropical regions, including subtropical United States and West Indies south to Peru and Bolivia.

OTHER COMMON NAMES.—mandarina (Spanish); naranja mandarina (Dominican Republic); mandarin orange, tangerine, king orange (United States, English); mandarine (French); mandarijn (Dutch West Indies).

BOTANICAL SYNONYM.—*Citrus nobilis* Andrews not Lour., *C. nobilis* var. *deliciosa* (Tenore) Swingle.

397. Mandarina, mandarin orange *Citrus reticulata* Blanco[3]

Flowering twig (above), fruiting twig (below), natural size.

398. Kunquat, kumquat ***Fortunella margarita*** **(Lour.) Swingle***

Kumquat, a relative of the citrus fruits, is sometimes planted in Puerto Rico for its smaller edible fruits and for ornament. Its distinguishing characters are: (1) leaves lanceolate, 1½–3½ inches long and ½–1¼ inches wide, blunt or short-pointed at both ends, with many minute rounded teeth at edges, slightly thickened, and shiny dark green with gland dots, with petiole jointed to blade; (2) small aromatic flowers mostly solitary at leaf bases, ⅝ inch across the 5 spreading white petals; and (3) fruit the edible kumquat, egg-shaped or oblong, 1¼–1¾ inches long and ¾–1⅛ inches broad, yellow or yellow orange, with edible peel.

An evergreen aromatic bushy shrub or small tree to 15 feet high with compact crown of the same width. Twigs green, angled, hairless, with minute gland dots, mostly without spines.

The alternate hairless leaves have stout petioles ¼–⅝ inch long, nearly round. Blades have inconspicuous veins and are dull light green on lower surface.

Flowers are solitary or few at leaf bases on stalks of about ¼ inch and develop from angular buds. The calyx is minute, with 5 teeth; corolla of 5 narrow white petals less than ½ inch long; 16 or 20 stamens in bundles; and on a disk the pistil with rounded usually 4–5-celled ovary with 2 ovules in each cell, short persistent style, and elliptic stigma.

The fruit (berry or hesperidium) known as kumquat resembles a small orange or lemon, covered with gland dots, composed of light yellow wall about ⅛ inch thick, mostly 4–5 cells with juicy yellow pulp. Seeds usually 1 in each cell, elliptic, whitish, ⅜ inch long.

The entire fruit except the seeds is edible, the outer rind or wall being slightly spicy from the aromatic oil, the whitish inner rind sweetish, and the pulp sour like a lemon. Also, marmalade and jelly are prepared from the fruit.

Uncommon as a cultivated fruit tree and ornamental in Puerto Rico. The plants can be trimmed as hedges.

RANGE.—Known only in cultivation but apparently native in southeastern China. Planted in tropical and subtropical regions of the world, including southern border of United States.

OTHER COMMON NAMES.—kumquat largo (Puerto Rico); oval kumquat, nagami kumquat (United States).

Kumquats are grown across the southern border of continental United States from Florida to California. The plants are hardier than most fruits and can be grown farther north, also as potted plants. Sprays of twigs with both leaves and fruits are sold for holiday decorations.

Two other species of kumquat have been planted occasionally in Puerto Rico and elsewhere in tropical and subtropical regions. Round kumquat or kumquat redondo, *Fortunella japonica* (Thunb.) Swingle,* known also as marumi kumquat, has round fruits ¾–1 inch in diameter with milder tasting peel, spines often solitary at leaf base, smaller leaves about 1–2 inches long, and smaller seeds. It also is known only in cultivation but apparently is native in southern China. Hongkong kumquat, *Fortunella hindsii* (Champ.) Swingle,* or kunquat de Hongkong, has smaller fruits about ⅜–⅝ inch in diameter, brillant scarlet orange when ripe, with 3–4 cells, spiny twigs, and elliptic leaves. It is native of Hongkong and adjacent China.

398. Kunquat, kumquat *Fortunella margarita* (Lour.) Swingle*

Flowering twig (above), fruiting twig (below), natural size.

399. Mirto, orange-jessamine ***Murraya paniculata* (L.) Jack**

Mirto or orange-jessamine is a handsome ornamental shrub common as a hedge and sometimes reaching tree size. It is recognized by: (1) small shiny dark green pinnate leaves 1½–4 inches long, with 3–9 elliptic to obovate leaflets finely wavy margined, with minute gland dots, with spicy citrus taste and odor when crushed; (2) fragrant white flowers ¾ inch across the 5 narrow curved petals, few and opening singly; and (3) showy shiny red fruits, elliptic or egg-shaped, ⅜–½ inch long.

Evergreen planted shrub in hedges 5–10 feet high or becoming a small tree to 25 feet high and 5 inches in trunk diameter, with spreading dense crown. The bark is gray, becoming fissured, rough, and shreddy. Inner bark is light brown and almost tasteless. Twigs are slender, green and finely hairy when young, afterwards light gray and finely fissured.

The alternate leaves are erect and stiff, pinnate, having a slender green, finely hairy axis ¾–3 inches long and 3–9 alternate leaflets. The leaflets on slender stalks 1/16–⅛ inch long are ½–1½ inches long and ¼–⅞ inch wide, elliptic to obovate and often broadest beyond middle, blunt or sometimes notched at apex, long-pointed at base, and finely wavy margined, slightly thick and stiff, becoming hairless or nearly so. The upper surface is shiny dark green, and the lower surface dull light green.

Flowers are few in clusters (corymbs) at or near ends of twigs on slender stalks less than ¼ inch long. The calyx is composed of 5 pointed green sepals 1/16 inch long, minutely hairy; petals 5, ½–¾ inch long, oblong, curved out and downward; stamens mostly 10, separate and of unequal length; and on a disk the slender pistil with 2-celled ovary, long style, and dot stigma.

The few red fruits (berries) clustered at ends of twigs stand out in the dark green foliage. The surface is shiny and has many minut gland dots. Within the watery bitter red pul are 1–2 elliptic light green seeds ¼–⅜ inc long. Flowering irregularly through the yea

The wood is described as light yellow wit light brown heartwood, hard, heavy, fine-tex tured, and good for turned articles.

This species has vigorous root growth an could serve as a stock for citrus fruits. Else where the roots and barks have been used i home remedies. Propagated from seeds an cuttings.

PUBLIC FOREST.—Susúa.

Mirto is grown in Puerto Rico and the Virgi Islands mainly as a hedge and ornamental i gardens and is an uncommon escape from culti vation. It is most common in the southwest o Puerto Rico and found also in St. Croix, S Thomas, Tortola, and Virgin Gorda. Plante through the West Indies and from Mexico t Brazil and becoming naturalized. Introduce as an ornamental in Florida and southern Ari zona and raised in greenhouses northward.

RANGE.—Southeastern Asia from India t China, Australia, Philippines, and Melanesia islands.

OTHER COMMON NAMES.—mirto, café de l India (Puerto Rico); mirto (Spanish); azaha de jardín (Dominican Republic); muraya muralera, boj de Persia, jazmín francés, jazmí de Persia (Cuba); limonaria (Guatemala, E Salvador); limoncillo (Guatemala); jazmín d Arabia (El Salvador); azahar (Colombia); orange-jessamine (United States); China-bo mockorange (Jamaica); bun (Haiti); dogwoo (St. Barts); boxwood (Dutch Antilles); S Patrick bush (Virgin Islands).

BOTANICAL SYNONYMS.—*Chalcas exotic* (L.) Millsp., *C. paniculata* L., *Murraya exotic* L. The generic name has been spelled also *Mu raea*.

399. Mirto, orange-jessamine *Murraya paniculata* (L.) Jack*

Twig with flowers and fruits (above), fruiting twig (lower left), natural size.

400. Aceitillo ***Pilocarpus racemosus* L.**

This odd rare shrub or small tree of the moist limestone forest is recognized by: (1) large palmately compound leaves with usually 3 (1–5) elliptic leaflets, with minute gland dots and aromatic; (2) many dark red 5-parted starlike flowers ¼ inch across on red stalks along an erect axis 6–14 inches long; and (3) the fruits from a flower are 1–3 dark brown rounded podlike parts nearly ½ inch long, each 1-seeded.

Evergreen shrub or sometimes a small tree to 15 feet high and 3 inches in trunk diameter, with few branches and stout green twigs, hairless throughout. The bark is gray and smooth, the inner bark whitish and tasteless.

The leaves are alternate and palmately compound (sometimes pinnate) with usually 3 (1–5) leaflets on stalks about ⅛ inch long at end of petiole of 1–3 inches. Leaflet blades are 2–6 inches long and 1–3½ inches wide, notched at apex and rounded or short-pointed at base, slightly thick and leathery, turned under at edges, with many minute gland dots, the upper surface shiny dark green and the lower surface dull yellow green.

The flower clusters (racemes) have a slender terminal erect brownish axis and many flowers on slender horizontal red stalks ⅜–⅝ inch long. The flowers consist of 5-lobed calyx less than $\frac{1}{16}$ inch long; starlike dark red corolla of 5 widely spreading pointed petals more than ⅛ inch long; 5 stamens; and on a disk the pistil with broad 5-celled ovary and short style. The 1–3 podlike fruits (follicles) maturing from a flower split open on 1 side. The seed is rounded and flattened, about ¼ inch long, and black. Flowering and fruiting intermittently.

The sapwood is light brown and hard.

The alkaloid pilocarpine, used in medicine, has been obtained from the dried leaflets of several species of this genus. Leaflets of this species were known as Guadeloupe jaborandi.

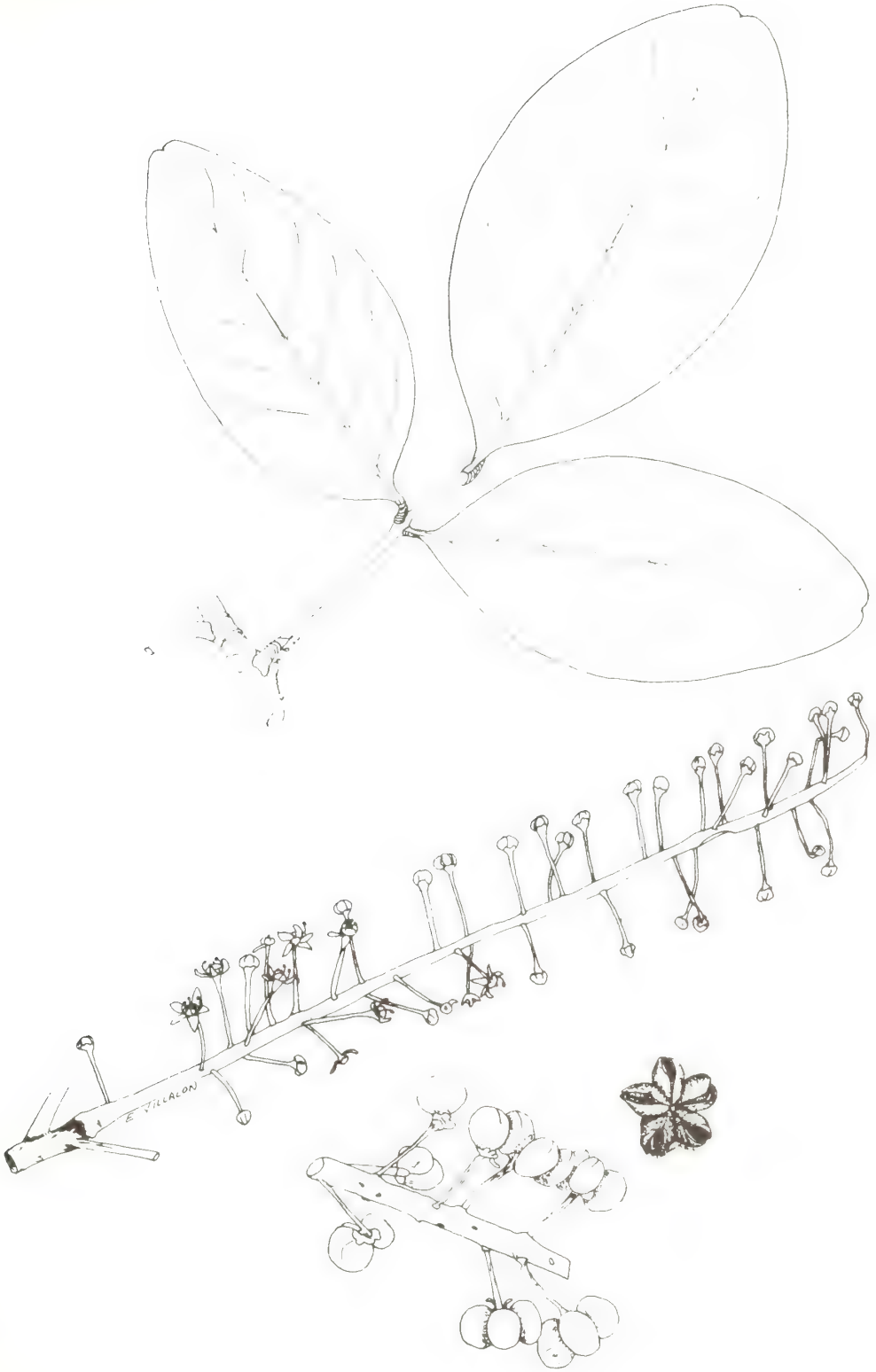
Rare in moist limestone forests at 200–600 feet altitude in northwestern Puerto Rico, collected near Aguada and Aguadilla and at Guajataca Forest. Also Culebra, Vieques, and St John.

PULIC FOREST.—Guajataca.

RANGE.—Cuba, Hispaniola, Puerto Rico Culebra, Vieques, St. John, Montserrat, Guadeloupe, and Martinique. Also from southern Mexico to Costa Rica. Recorded from Aruba and Curacao.

OTHER COMMON NAMES.—cortés (El Salvador); bois blanc, flambeau caraïbe (Guadeloupe); flamboir noir, bois flambeau (Martinique); burachi, palu cayente (Aruba, Curacao).

BOTANICAL SYNONYM.—*Pilocarpus longipes* Rose.



400. Aceitillo *Pilocarpus racemosus* L.

Leaf (above), flowers and fruits (lower right), two-thirds natural size.

401. Tortugo prieto ***Ravenia urbanii* Engler**

This small tree known only from eastern mountains of Puerto Rico is recognized by: (1) the opposite, stalkless, elliptic to ovate, short-pointed, leathery, dark green leaves 2–6 inches long and 1–3½ inches wide, with many minute gland dots; and (2) the few showy crimson tubular flowers 1 inch long and broad at the base of a leaf, the corolla unequally 5-lobed.

An evergreen tree 25 feet high (rarely 40 feet) and 5 inches or more in trunk diameter, with a narrow crown. The bark is smoothish, dark gray, and thin, with whitish tasteless inner bark. The young twigs are slightly flattened and 2-angled, broadest just below leaves. The opposite leaves are broad and rounded at base, not toothed on edges, hairless, paler beneath.

Flower clusters are lateral or terminal, bearing 1–7 flowers nearly stalkless or on a stalk about 1 inch long. Sepals 5, 2 long and 3 short, ⅛–½ inch long; the crimson tubular corolla with 5 unequal lobes, with minute gland dots; stamens 4, attached to the corolla tube, only the lower 2 fertile; and pistil of ovary with 4 or 5 lobes and cells, slender style, and 4–5-lobed stigma. The dry brown fruit about ⅜ inch long and broad is composed of 5 podlike parts (follicles), each with 1 or 2 seeds more than ⅛ inch long and splitting open. In flower and fruit throughout the year.

The sapwood is whitish, hard, and heavy (specific gravity 0.9). Chief local uses of the wood are for posts and fuel.

This handsome tree is being tested as a promising ornamental for its dark green foliage and few red flowers.

Rare in upper Luquillo and upper Cordillera forest regions at 1,500–3,000 feet altitude in eastern Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo.

RANGE.—Known only from mountains of eastern Puerto Rico.

Dedicated to Ignatz Urban (1848–1931), German botanist and authority on West Indian plants.

401. Tortugo prieto

Ravenia urbanii Engler

Flowering twig (above), fruiting twig (lower right), natural size.

402. Chinita, sweet-lime, limeberry ***Triphasia trifolia*** **(Burm. f.) P. Wils.***

This introduced shrub or rarely a small tree is closely related to the citrus fruits. It is recognized by: (1) paired slender spines ¼–⅝ inch long at nodes of the finely hairy greenish twigs; (2) leaves 1–2 inches long, composed of 3 ovate shiny dark green leaflets with finely wavy edges and many gland dots, aromatic when crushed; (3) fragrant cup-shaped flowers with 3 white petals ⅝ inch long, 3 or fewer at leaf bases; and (4) elliptic reddish fruits ½–⅝ inch long with thick skin and mucilaginous spicy pulp.

Evergreen shrub 6–10 feet high or rarely a small tree to 15 feet. Leaves alternate, hairless, with slender petiole ⅛ inch long and 3 leaflets on very short stalks, the middle leaflet about twice as large as the others. Leaflet blades ½–1½ inches long and ⅜–1 inch wide, slightly notched or rounded at apex, short-pointed at base, slightly thickened, with numerous gland dots plainer on the light green lower surface. Foliage compact, often drooping.

The short-stalked gland-dotted flowers are composed of 3-toothed hairy green calyx 1/16 inch long; corolla of 3 (sometimes 4) spreading narrow white petals ⅝ inch long; 6 stamens on a disk; and pistil with elliptic 3-celled ovary, long style, and rounded stigma. Berries aromatic, gland-dotted, with calyx at base, containing usually 1 seed about ¼ inch long in the sticky pulp. Flowering and fruiting irregularly through the year.

The plants are grown as ornamental shrubs and in hedges. The mucilaginous juicy fruits are edible and have been used in making marmalade and jam. A honey plant. Popular as a landscape shrub in southern Florida. Propagated by seeds and cuttings.

Planted and naturalized in Puerto Rico and Virgin Islands. Recorded from Vieques, St. Thomas, St. John, and Tortola.

PUBLIC FOREST AND PARK.—Estate Thomas; Virgin Islands.

RANGE.—Native of southeastern Asia or East Indies. Widely cultivated and naturalized in tropical and subtropical regions.

Planted in southern continental United States from Florida to Texas and recorded as naturalized but injured by severe frosts.

OTHER COMMON NAMES.—china de Bakón, limón de Jerusalén, china forastera, limoncito (Puerto Rico); limoncillo (Spanish); limeberry; sweet-lime (English); bergamot-lime, trifoliate limeberry, (United States); sweet-lemon (St. Barts); myrtle lemon, lamoentsji die Surinaam, lamoentsji sjimarón (Dutch Antilles); naranjita de pegar (Dominican Republic).

402. Chinita, sweet-lime, limeberry *Triphasia trifolia* (Burm. f.) P. Wils.*

Flowering twig (left), fruiting twig (right), natural size.

403. ***Zanthoxylum bifoliolatum*** **Leonard**

This rare shrub or small tree of the western mountains in Puerto Rico is distinguished by: (1) scattered slender sharp spines to 1/4 inch long on the twigs; (2) compound leaves with only 2 obovate or spoon-shaped leaflets, stiff and thick, and usually a spine at apex of petiole; (3) many or few small flowers 3/16 inch wide clustered at leaf bases; and (4) round black pods 3/16 inch wide, 1 or 2 from a flower, 1-seeded.

Evergreen shrub 5–8 feet high or sometimes a small tree to 25 feet in height and 4 inches in trunk diameter, hairless throughout. Bark gray, fissured. Twigs slender with straight spines.

Leaves alternate, compound, 1–2 inches long, with slender petiole 1/8–3/8 inch long and 2 blades, sometimes only 1, stalkless or nearly so. Blades obovate or spoon-shaped, 3/4–1 1/2 inches long and 3/8–1 1/8 inches wide (to 4 by 2 inches in Hispaniola), slightly notched at rounded apex, short-pointed at base, turned under at edges, with minute gland dots, the upper surface shiny green with sunken midvein and many prominent parallel side veins, and the lower surface light green and slightly shiny with raised veins.

Flowers are male and female in different clusters, short-stalked at leaf bases, apparently on different trees (dioecious). Male flowers have 3–4 minute sepals, 3–4 petals more than 1/16 inch long, 3–4 stamens 1/8 inch long, and minute nonfunctioning pistil. Female flowers have 3 sepals, 3 petals, and on a disk 2 united pistils less than 1/16 inch long, each with rounded ovary, short style, and dot stigma. Each pod (follicle) splits open on 1 side and contains 1 shiny black seed 1/8 inch in diameter. With flowers and fruits in summer and autumn.

Wood light brown, hard.

Rare in upper Cordillera forest at 2,000–2,500 feet altitude in western Puerto Rico.

PUBLIC FOREST.—Maricao.

RANGE.—Hispaniola (Haiti and Dominican Republic) and Puerto Rico.

This species was discovered in the Dominican Republic in 1922 and was named in 1924. In Puerto Rico it was first collected by the Forest Service in 1938.

403. *Zanthoxylum bifoliolatum* Leonard

Fruiting twig (above), flowering twig (lower right), natural size.

404. Espino rubial ***Zanthoxylum caribaeum* Lam.**

This spiny tree is characterized by: (1) sharp very stout brown spines 1/8–3/8 inch long with broad conical base, on trunk and branches; (2) pinnate leaves with 7–13 elliptic leaflets bordered with wavy teeth, with minute gland dots, and with disagreeable odor when crushed; (3) many small greenish white flowers 3/16 inch broad in branched clusters; and (4) the podlike dark gray fruits about 1/4 inch long, 5–1 from a flower, each opening by 1 line to release 1 seed.

Small to medium-sized tree 60 feet high and 10 inches in trunk diameter in Puerto Rico, elsewhere a large tree to 70 feet high and 1 1/2 feet in trunk diameter, often branched from base, with spreading or rounded crown, perhaps deciduous in dry areas. The spiny trunk has gray bark, smooth to rough and thick. Inner bark is light brown and bitter. The stout hairless twigs are green when young, afterwards gray.

The alternate leaves with light green axis are mostly 8–10 inches long. The leaflets have short stalks about 1/8 inch long. Blades are 1 1/4–4 inches long and 3/4–2 inches wide, slightly thick and leathery, hairless, short-pointed or rounded at both ends, the borders with wavy teeth and turned under, the upper surface green to dark green and slightly shiny, and the lower surface dull and paler.

The flower clusters (panicles) are terminal and lateral, 3–6 inches long, with corky thickened branches. The small flowers are composed of 5 rounded sepals less than 1/16 inch long, 5 white petals about 3/16 inch long, 5 stamens, and 5–1 pistils (carpels) with 1-celled ovary and stigma. The fruits (follicles) are 5–1 from a flower, each with short stalk and 1 shiny rounded blackish seed 3/16 inch long. With flowers and fruits from spring to fall.

The thick sapwood is lustrous yellow and the heartwood dark brown. The wood has a bitter taste and characteristic odor and is moderately lightweight. It is strong, easy to work, takes a good polish, does not split under exposure, but is not resistant to insects. Suitable uses are veneer, cabinetmaking, and general construction.

Elsewhere it is reported that the bark and twigs of this and related species are chewed as a remedy for toothache.

Uncommon in moist limestone forest of Puerto Rico at 100–600 feet altitude.

PUBLIC FORESTS.—Cambalache, Guajataca, Río Abajo.

RANGE.—Puerto Rico, Guadeloupe, Dominica, Martinique, and Barbados. Also from Mexico to British Honduras, Guatemala, and Honduras and in northern South America from Colombia to Ecuador, Venezuela, and Guyana.

OTHER COMMON NAMES.—zorillo, sinanche (Mexico); duerme-lingua, cedrillo (Honduras); amamor, mapurito prieto, tachuelo (Colombia); mapurite, mapurite blanco, mapurite negro, cenizo, bosú (Venezuela); white Hercules, harkis (Barbados); prickly-yellow (British Honduras); l'épineux blanc, bois chandelle blanc (Guadeloupe, Martinique).

BOTANICAL SYNONYM.—*Fagara caribaea* (Lam.) Krug & Urban.

404. Espino rubial *Zanthoxylum caribaeum* Lam.

Female flowers (upper left), twig with fruits (upper right), twig with male flowers (below), two-thirds natural size.

405. Alfiler ***Zanthoxylum punctatum* Vahl**

An uncommon shrub, sometimes a small tree, identified by: (1) straight slender brown spines or prickles of 1/8 inch usually present on petioles, leaf axes, and midvein of lower leaflet surfaces; (2) leaves pinnate, with 2–7, commonly 3 (rarely 9–19) leaflets, paired except at end, elliptic or obovate, aromatic, with minute gland dots and spicy taste; (3) small 3-parted flowers 3/16 inch broad, few at leaf base; and (4) fruits 2 or 1 from a flower, rounded, 3/16 inch long, podlike, 1-seeded.

Deciduous shrub or rarely a small tree 20 feet or more in height. Bark gray, fissured, with stout spines.

The alternate leaves are about 1½–6 inches long, odd pinnate, hairless, with slender petioles ½–1½ inches long and grooved. Leaflets are paired except at end (sometimes without end leaflet), ¾–3 inches long and ⅜–1¼ inches broad, almost stalkless, the apex notched, rounded, or pointed, the base short-pointed, and the margin straight or minutely wavy, shiny green on upper surface, and dull light green with gland dots on lower surface. Leaves on flowering twigs usually without spines.

Flowers several at leaf bases or terminal, on stalks 1/16 inch long, male and female apparently on different plants (dioecious), 3/16 inch broad, with 3 minute sepals and 3 white or yellowish petals less than 1/8 inch long. Male flowers have 3 stamens. Female flowers have 2 pistils partly united at base, each with ovary, style, and stigma. The 2 gray fruits (follicles) partly united split open on 1 side. Seeds are rounded, shiny black, about 1/8 inch long. Flowering and fruiting from spring to fall.

This and related species have been used elsewhere in home remedies for toothache, hence the common name toothache-tree.

Uncommon and local in lower and upper Cordillera forests from sea level to 2,000 feet altitude in western and southwestern Puerto Rico. Also Mona and St. Croix.

PUBLIC FORESTS.—Maricao, Susúa.

RANGE.—Jamaica, Hispaniola, Mona, Puerto Rico, St. Croix, and Lesser Antilles from St. Martin to Barbados and Trinidad and Venezuela.

OTHER COMMON NAMES.—toothache-tree (Jamaica); l'épineux (French); l'épineux rouge, bois flambeau, bois d'Inde marron (Guadeloupe); bois flambeau noir l'épineux (Martinique).

BOTANICAL SYNONYMS.—*Fagara trifoliata* Sw., *Zanthoxylum trifoliatum* (Sw.) W. Wright, not L.

405. Alfiler *Zanthoxylum punctatum* Vahl

Fruiting twig (above), flowering twig (below), natural size.

406. Niaragato ***Zanthoxylum spinifex* (Jacq.) DC.**

This rare very spiny shrub or small tree of dry areas is easily recognized by: (1) many very slender straight sharp spines 1/16–1/4 inch long, paired at leaf bases and on nodes along very slender twigs; (2) the green to gray twigs very slender, zigzag, and widely forking; (3) many crowded very small light green pinnate leaves 1/2–1 1/2 inches long, composed of 3–7 (rarely to 11) narrow leaflets, paired at end, and broad or winged axis, aromatic, with minute gland dots and spicy taste; (4) small 4-parted yellow flowers 1/8 inch broad at leaf base; and (5) fruits 2 or 1 from a flower, rounded, blackish, more than 1/8 inch long, pod-like, 1-seeded.

Deciduous shrub or rarely a small tree 15 feet high with several stems to 3 inches in diameter, and widely spreading flat-topped crown of very thin foliage, hairless throughout. Bark light brown, smoothish, slightly fissured, with spines sometimes persistent. Inner bark yellowish, with thin greenish outer layer, bitter. Twigs very slender, zigzag, widely forking, minutely hairy when young, green becoming gray and finely fissured.

The leaves are alternate and only 1/4–1/2 inch apart, odd pinnate, hairless or nearly so. At the base of each leaf are paired brown spines (stipules), very slender, sharp, 1/16–1/4 inch long and widely forking, remaining on the branches. The petiole 1/4–3/8 inch long and the axis are winged and about 1/16 inch wide. The leaflets are paired except at end, stalkless or nearly so, 1/8–1/2 inch long and 1/16–3/16 inch wide, rounded or blunt at both ends, not toothed on edges, thin, the side veins inconspicuous, slightly shiny above and dull beneath, with 2 minute light brown glands at base.

Flowers several, sometimes only 1, at leaf bases, almost stalkless, male and female apparently on different plants (dioecious), 1/8 inch broad, with 4 minute greenish sepals and 4 yellow petals 1/16 inch long. Male flowers have 4 stamens 1/8 inch long. Female flowers have 2 pistils, each with rounded ovary, slender style, and united stigma. The fruits (follicles) have style at apex and split open on 1 side. Each has 1 shiny black rounded seed nearly 1/8 inch long. Collected in flower in July and with fruits in August.

Sapwood light brown, hard.

Rare and local in dry coastal thickets and forests from sea level to 100 feet altitude from Coamo to Guánica in southwestern Puerto Rico. Also, St. Croix and Buck Island and St. Thomas and its Buck Island.

PUBLIC FOREST AND PARK.—Guánica; Buck Island Reef.

RANGE.—Cuba, Hispaniola, Puerto Rico, St. Croix, Lesser Antilles from Anguilla, St. Martin, and St. Barts to St. Lucia and Barbados, and Venezuela.

OTHER COMMON NAMES.—uña de gato (Dominican Republic); fingle-me-go, fingrigo (Barbados); l'épineaux (St. Barts); bois chandelle, bois l'épineaux blanc, bois à piano, bois blanc à flambeau (Guadeloupe); bois flambeaux (Martinique).

BOTANICAL SYNONYM.—*Fagara spinifex* Jacq.

406. Niaragato *Zanthoxylum spinifex* (Jacq.) DC.

Fruiting twig (at left), twig with female flowers (upper right), twig with male flowers (lower right), natural size.

407. ***Zanthoxylum thomasianum*** **(Krug & Urban) Krug & Urban**

A rare shrub or small tree with prickly twigs characterized by: (1) pinnate leaves with 5–9 stalkless leaflets ovate or rounded, $\frac{5}{8}$–1 inch long and $\frac{1}{2}$–$\frac{3}{4}$ inch wide; (2) few flowers stalkless at leaf bases, $\frac{1}{8}$ inch long, 3-parted; and (3) fruit of 3, sometimes 2 or 1, pods $\frac{5}{16}$ inch long from a flower.

An evergreen shrub 6 feet high or a small tree to 20 feet and 4 inches in trunk diameter. Twigs with minute hairs when young, prickly, with 1–2 slender sharp brownish spines less than $\frac{1}{4}$ inch long at leaf bases.

Leaves alternate, $1\frac{1}{4}$–$2\frac{1}{2}$ inches long, with 5–9 leaflets, the end leaflet largest, rounded or abruptly pointed at apex, blunt or rounded at base, and often slightly wavy on edges, slightly thickened, shiny green with many fine side veins, beneath paler and sometimes with 1–3 spines on midvein.

Flowers male and female on different plants (dioecious), with 3 sepals less than $\frac{1}{16}$ inch long and 3 elliptic petals about $\frac{1}{8}$ inch long. Male flowers have 3 stamens, and female flowers have 3 pistils slightly united. The fruits (pods or follicles) are egg-shaped, 3, sometimes 2 or 1, from a flower, each splitting open on 1 side and containing 1 black seed $\frac{3}{16}$ inch long. Flowering and fruiting in spring and early summer and maturing fruits in summer.

Rare in lower Cordillera forest at 500–1,500 feet altitude on south slopes of Coamo-Cayey area in Central Cordillera of Puerto Rico. Also mountain forests of St. Thomas and St. John.

PUBLIC PARK.—Virgin Islands.

RANGE.—Puerto Rico, St. Thomas, and St. John.

This species was known as a shrub on St. Thomas and St. John, and named for the former island. More recently it has been found as a small tree in mountains of east central Puerto Rico.

BOTANICAL SYNONYM.—*Fagara thomasiana* Krug & Urban.

407. *Zanthoxylum thomasianum* (Krug & Urban) Krug & Urban

Natural size.

AILANTHUS FAMILY (SIMAROUBACEAE)

Shrubs and trees, known by: (1) bark, wood, and other parts often very bitter; (2) leaves alternate, pinnate, with leaflets generally entire, without stipules; (3) flowers mostly small, often in large branched clusters (panicles), mostly male and female and usually on different plants (dioecious), regular, with 3–8-lobed calyx, 3–8-lobed corolla or none, as many stamens as petals or double and often with scales at base, inserted on or around the disk, and on disk 2–5 simple pistils with 1-celled ovary and style, or pistil composed of 2–8 cells and 2–8 styles; and (4) fruit generally a capsule, drupe, or winged (samara). Also vol. 1, p. 234.

Key to species

A. Leaves simple, gray green hairy.
  B. Twigs often ending in spines; leaves small, ⅜–1 inch long—408. *Castela erecta.*
  BB. Twigs not spiny; leaves very narrow, 1½–2½ inches long, thick and slightly succulent—412. *Suriana maritima.*
AA. Leaves pinnate.
  C. Leaflets 6–10, mostly paired, upper surface shiny dark green with indistinct veins; flowers dark red showy; hairless throughout—411. *Simarouba tulae.*
  CC. Leaflets mostly 5–13, mostly paired except at end; flowers minute, greenish; young twigs hairy.
    D. Flower clusters terminal; leaflets 5–9; fruits berrylike, round to elliptic, red, ⅜–⅝ inch long—104. Guarema, bitterbush, *Picramnia pentandra* Sw.
    DD. Flower clusters lateral at leaf bases; leaflets 7–13; fruits round, black, 1 or sometimes 2–3 from a flower—*Picrasma.*
      E. Fruits ⅜–½ inch in diameter—409. *Picrasma antillana.*
      EE. Fruits ¼ inch in diameter—410. *Picrasma excelsa.*

408. *Castela erecta* Turp.

This much-branched spiny shrub of dry areas rarely becomes a small tree. Its distinguishing characters are: (1) twigs very bitter, often ending in spines, shorter spines single at leaf bases; (2) leaves small, oblong to elliptic or obovate, ⅜–1 inch long and 3/16–½ inch wide, thick and leathery, shiny green and hairless or nearly so above, densely whitish hairy beneath; (3) small whitish to red flowers ⅛ inch long, few at leaf bases, 4-parted; and (4) red rounded fruits (drupes) 1–4 from a flower, ¼–⅜ inch long.

An evergreen spiny shrub 3–8 feet high or rarely a small tree to 15 feet high and 4 inches in trunk diameter, much branched with dense foliage, very bitter throughout. Twigs stiff, often slightly zigzag, finely whitish hairy, often ending in spines and with shorter spines about ⅛ inch long single at leaf bases.

Leaves alternate, stalkless or nearly so, rounded or abruptly short-pointed at apex, short-pointed or rounded at base, turned under at edges.

Flowers male and female on different plants (dioecious), at leaf bases. There are 4 tiny pointed sepals, 4 elliptic petals less than ⅛ inch long, and 8 stamens in male flowers. Female flowers have 8 sterile stamens (staminodes), and 4 nearly separate ovaries united at apex, each with 1 ovule, and 4 short style branches. Fruits 1–4 from a flower, fleshy with hard stone, opening in 2 parts, containing 1 seed. With flowers and fruits in spring.

The red flowers and fruits, the whitish twigs and lower leaf surfaces, and the shiny green upper surfaces make this a showy plant. Possibly of value as an ornamental in dry areas.

Locally common in dry coastal forest from sea level to 300 feet altitude in southwestern Puerto Rico. Also dry thickets on hillsides in eastern and southern St. Croix. Desecheo, Culebra, Vieques, St. John, Tortola, and Virgin Gorda.

RANGE.—Puerto Rico and Virgin Islands, Antigua, Curacao, Aruba, northern Venezuela, including Margarita and Cubagua, and northern Colombia.

OTHER COMMON NAMES.—retama (Venezuela); goat-bush (Antigua).

BOTANICAL SYNONYMS.—*Castela nicholsonii* Hook., *Castelaria nicholsonii* (Hook.) Small, *Castelaria erecta* (Turp.) Small.

408. *Castela erecta* Turp.

Flowering twigs (above), fruit (below), natural size.

409. Bitter-ash ***Picrasma antillana*** **(Eggers) Urban**

This small tree rare in the Virgin Islands is identified by: (1) pinnate leaves with 7–13 oblong leaflets paired except at end, not toothed on edges, rounded and unequal at base; (2) short-stalked, flattened, widely forking clusters of small flowers at leaf bases; and (3) many round fruits ⅜–½ inch in diameter, 1 or sometimes 2–3 from a flower.

Small evergreen tree 30 feet high, with bark and sap bitter. Twigs finely hairy, light brown with whitish dots (lenticels).

Leaves alternate, pinnate, 10–16 inches long, with axis finely hairy. Leaflets on short stalks ⅛–¼ inch long are 2½–4½ inches long and 1–1¾ inches wide, tapering to a long-pointed blunt apex, thin, the upper surface hairless, and the lower surface with raised veins often hairy.

Flower clusters (panicles) at leaf bases are short-stalked, flattened, and bear at the end of widely forking finely hairy branches many flowers mostly male and female on separate trees (polygamous). Male flowers about ¼ inch long and wide are composed of 4–5 minute hairy sepals, 4–5 narrow petals less than ⅛ inch long, and 4–5 spreading slender stamens 3/16 inch long at base of a large disk. Female flowers have 4–5 minute hairy sepals, 4–5 broader elliptic petals ⅛ inch long, and ovary with 2–3 lobes and 2–3 cells each 1-ovuled, style, and 2–3-lobed stigma. Many fruits (drupes) 1 or sometimes 2–3 from a flower, each on a short stalk 1/16 inch long above persistent sepals and petals at base, slightly fleshy, 1-seeded.

The wood is described as yellowish, hard, heavy, and durable.

Elsewhere the bitter bark has served in home remedies.

Rare in forests in St. Croix, St. Thomas, St. John, and Tortola. Not recorded previously from Tortola.

PUBLIC PARKS.—Virgin Islands, Sage Mountain.

RANGE.—Virgin Islands and Lesser Antilles from St. Martin, St. Barts and Saba to St. Vincent and Barbados.

OTHER COMMON NAMES.—bitter-ash, quassia (Montserrat); bitter-ash, bitter-bark, gall-tree (Barbados); cheakyberry (Saba); peste à poux, bois noyer, graines vertes (Guadeloupe); bois amer, frêne amer (Martinique); bitter-ash, simaruba (Dominica).

BOTANICAL SYNONYMS.—*Aeschrion antillana* (Eggers) Small, *Picraena antillana* (Eggers) Fawc. & Rendle.

409. Bitter-ash *Picrasma antillana* (Eggers) Urban

Twig with male flowers (left), female flowers and fruits (lower right), two-thirds natural size.

410. Palo amargo, bitterwood ***Picrasma excelsa*** **(Sw.) Planch.**

A very rare tree collected near Coamo Springs, characterized by: (1) pinnate leaves with 9–13 oblong to lance-shaped leaflets paired except at end, short-pointed and unequal at base, the edges straight or slightly rolled under; (2) many small yellow-green flowers in long-stalked clusters at leaf bases; and (3) many round black fruits ¼ inch in diameter, 1 or sometimes 2–3 from a flower.

Medium-sized evergreen tree recorded to 65 feet high, with bitter bark and sap. Bark gray, fissured. Twigs finely hairy.

Leaves alternate, pinnate, 6–14 inches long, with axis finely hairy or becoming hairless. Leaflets 2–5 inches long and ¾–1½ inches wide, tapering to a long-pointed blunt apex, thin, the upper surface nearly hairless, the lower surface paler and finely hairy, especially on veins.

Flower clusters (panicles) long-stalked at leaf base bear many flowers mostly male and female on separate trees (polygamous). Male flowers about 3/16 inch long and wide, consisting of 4–5 minute hairy sepals, 4–5 petals more than 1/16 inch long, and 4–5 hairy stamens ⅛ inch long at base of disk. Female flowers have 4–5 minute hairy sepals, 4–5 larger petals ⅛ inch long, and pistil with 2–3-lobed and 2–3-celled ovary, slender style, and 2–3-forked stigma. Many fruits (drupes) 1 or sometimes 2–3 from a flower, each on a stalk nearly ⅛ inch long, slightly fleshy, 1-seeded.

Wood whitish yellow, soft.

Elsewhere a bitter tonic from this tree has been used in home remedies. The dried heartwood has served in medicine under the names quassia, Jamaica quassia, and bitterwood.

In Puerto Rico collected only at plains and arroyos in the vicinity of Coamo Springs, with fruits in March. Not observed by the authors.

RANGE.—Jamaica, Hispaniola, and Puerto Rico. Also northern Venezuela.

OTHER COMMON NAMES.—leña amarga (Puerto Rico); bitterwood, Jamaican quassia (Jamaica); gorie frêne (Haiti).

BOTANICAL SYNONYMS.—*Aeschrion excelsa* (Sw.) Kuntze, *Picraena excelsa* (Sw.) Lindl.

410. Palo amargo, bitterwood *Picrasma excelsa* (Sw.) Planch.

Twig with male flowers (left), female flowers (upper right), fruits (lower right), two-thirds natural size.

411. Aceitillo cimarrón ***Simarouba tulae* Urban**

This beautiful uncommon shrub or tree native only in Puerto Rican mountains is recognized by: (1) pinnately compound leaves with 5–10 mostly paired oblong to elliptic leaflets, shiny dark green; (2) dark red showy flowers ½ inch broad, many in long-stalked terminal clusters; and (3) from a flower 1–5 red obovoid vertically flattened, slightly fleshy fruits 1–1¼ inches long and ⅝–1 inch wide.

Evergreen shrub flowering when 5–10 feet high, or a small tree to 25 feet high and 8 inches in trunk diameter, hairless throughout. Recorded as formerly a medium-sized tree to about 60 feet high and 12–20 inches in trunk diameter. Bark furrowed, very bitter. The purplish twigs become finely fissured, exposing light brown inner bark.

The alternate pinnate leaves 6–14 inches long have a slender round purplish-brown axis. The leaflets on short stalks ⅛ inch long are 2–4 inches long and ¾–2 inches wide, long-pointed at apex, short-pointed at base, with edges slightly turned under, slightly thickened, upper surface shiny dark green with indistinct veins, lower surface slightly shiny yellow green.

Flower clusters (panicles) are 4–6 inches long and broad, much branched at end of long erect terminal stalk. Many small flowers are borne on slender dark red stalks, male and female on different clusters or plants. The male flower is composed of dark red calyx 1/16 inch long, with 5 short-pointed lobes, corolla of 5 spreading dark red petals ⅜ inch long and ⅛ inch broad, and 10 stamens 5/16 inch long. Female flowers not seen but in this genus have a pistil with ovary usually deeply 5-lobed and 5-celled, short style, and 5 spreading stigmas. From a flower 1–5 spreading fruits (drupes) are produced, obovoid, flattened, each containing 1 flattened seed. Flowering and fruiting intermittently during the year.

The wood is described as heavy (specific gravity 0.85), strong, and durable.

Uncommon in lower and upper Luquillo and Cordillera forests at 500–2,500 feet altitude in mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Río Abajo, Susúa.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAMES.—aceitillo, aceitillo falso (Puerto Rico).

This species, which flowers as a shrub, is being tested as an attractive ornamental for its showy flowers and glossy leaves. The original description stated the height as 8–15 meters (26–49 feet), but no trees of that size have been seen in recent years. Because of the useful wood, the trees were cut long ago, and the species has become scarce.

Ignatz Urban dedicated this handsome plant to Tula Krug, wife of the German consul in Puerto Rico, Carl Wilhelm Leopold Krug (1833–1898). She contributed to the knowledge of the Puerto Rican plants by making many colored drawings and by recording the uses and vernacular names.

411. Aceitillo cimarrón *Simarouba tulae* Urban

Flowering twig (above), fruits (lower right), two-thirds natural size.

412. Temporana, baycedar *Suriana maritima* L.

Temporana or baycedar, a rounded shrub of sandy beaches, sometimes becomes a small tree. It is easily recognized by: dense rounded mass, much branched, of gray-green foliage; (2) very narrow leaves, finely hairy, slightly thick, succulent, and salty, crowded at ends of twigs and persistent after dying; (3) few yellow 5-parted flowers 3/8 inch long in short terminal clusters; and (4) fruits 5 or fewer from a flower, rounded, 3/16 inch long, brownish black and finely hairy.

This evergreen shrub commonly forms rounded clumps 5–10 feet in diameter but sometimes becomes a small tree 15 feet high and 5 inches in trunk diameter. The bark is dark gray, becoming thick, rough, and furrowed, the inner bark light yellow and tasteless. Twigs are light green, finely hairy, bearing crowded leaves at ends and dead leaves below.

The leaves are crowded but alternate, very narrow (linear to narrowly spatulate), 1½–2½ inches long, ¼–⅜ inch wide, more than 1/16 inch thick, slightly succulent with a slightly salty taste, broadest near the rounded apex and gradually narrowed to the stalkless base, gray green, finely and densely hairy.

The few or solitary flowers have pale yellow stalk, 5 large pointed hairy sepals about ⅜ inch long, 5 yellow obovate petals shorter then sepals, 10 stamens, and 5 separate pistils with hairy rounded ovary and threadlike style attached near base. The 5 hard dry 1-seeded fruits (akenelike) from a flower are bordered by the 5 gray dead sepals, which remain after fruits fall. Flowering and fruiting intermittently through the year.

The wood is described as having dark red or reddish-brown heartwood and lighter sapwood, hard, heavy, of fine uniform texture, strong, and apparently durable. Where sufficiently large, it could be used for small articles of turnery.

Locally common, scattered and widely distributed on sandy beaches of dry coasts of Puerto Rico and nearly all smaller islands nearby. Mona, Icacos, Vieques, Culebra, St. Croix and Buck Island, St. Thomas, St. John, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Aguirre, Boquerón, Guánica, San Juan; Buck Island Reef, Virgin Islands.

RANGE.—Florida including Florida Keys, Bermuda, from Bahamas through West Indies, and continental tropical America from Mexico to Brazil. Also in Pacific islands and Old World tropics from Australia and Asia to Africa.

OTHER COMMON NAMES.—guitarán (Puerto Rico); jovero, guazumilla (Dominican Republic); cuabilla, cuabilla de costa (Cuba); pantsil (Mexico); cucharo (Venezuela); baycedar (United States); baycedar, tassel-plant (Bahamas); crisse marine (Haiti); palo corra (Aruba, Curacao).

BURSERA FAMILY (BURSERACEAE)

Trees and shrubs, known by: (1) bark often smooth, with aromatic resin; (2) leaves generally alternate and odd pinnate, sometimes with winged axis, without stipules; (3) flowers minute, generally in clusters (panicles or racemes), bisexual or male and female, regular, with calyx of 3–5 sepals or lobes, 3–5 petals, disk, 3–5 or 8–10 separate stamens, and pistil composed of superior ovary of 2–5 cells each with 3 ovules, short style, and 2–5-lobed stigma; and (4) fruit a berry, drupe, or capsule with 1–5 seeds. Vol. 1, p. 236.

Key to species (Nos. 105–107)

A. Leaflets asymmetrical at base, less than 3 inches long; flowers 5-parted—105. Almácigo, turpentine-tree, gumbo-limbo, *Bursera simaruba* (L.) Sarg.

AA. Leaflets symmetrical at base, 2½–7 inches long.

B. Leaflets short-pointed or rounded at both ends; flowers 3-parted—106. Tabonuco, *Dacryodes excelsa* Vahl.

BB. Leaflets long-pointed at apex, short-pointed at base; flowers 4-parted—107. Masa, *Tetragastris balsamifera* (Sw.) Oken.

2. Temporana, baycedar *Suriana maritima* L.

Fruiting twig (above), flowering twig (lower right), natural size.

MAHOGANY FAMILY (MELIACEAE)

Trees, often large, and shrubs, known by: (1) bark bitter and astringent and wood often aromatic; (2) naked buds with minute young leaves often in form of hand; (3) leaves alternate generally pinnate, often even pinnate with paired leaflets, usually entire and often oblique, without stipules; (4) flowers small, generally in branched clusters (panicles), bisexual, regular, with 4–5-lobed calyx, corolla of 4–5 petals or lobes, 8–10 stamens united in a tube (5 separate in *Cedrela*) and around a disk, and pistil with superior ovary of 2–5 cells, each with 2 to many ovules, style or none, and stigma often dislike; and (5) fruit generally a capsule or berry with seeds often winged. Also vol. 1, p. 242.

Key to species

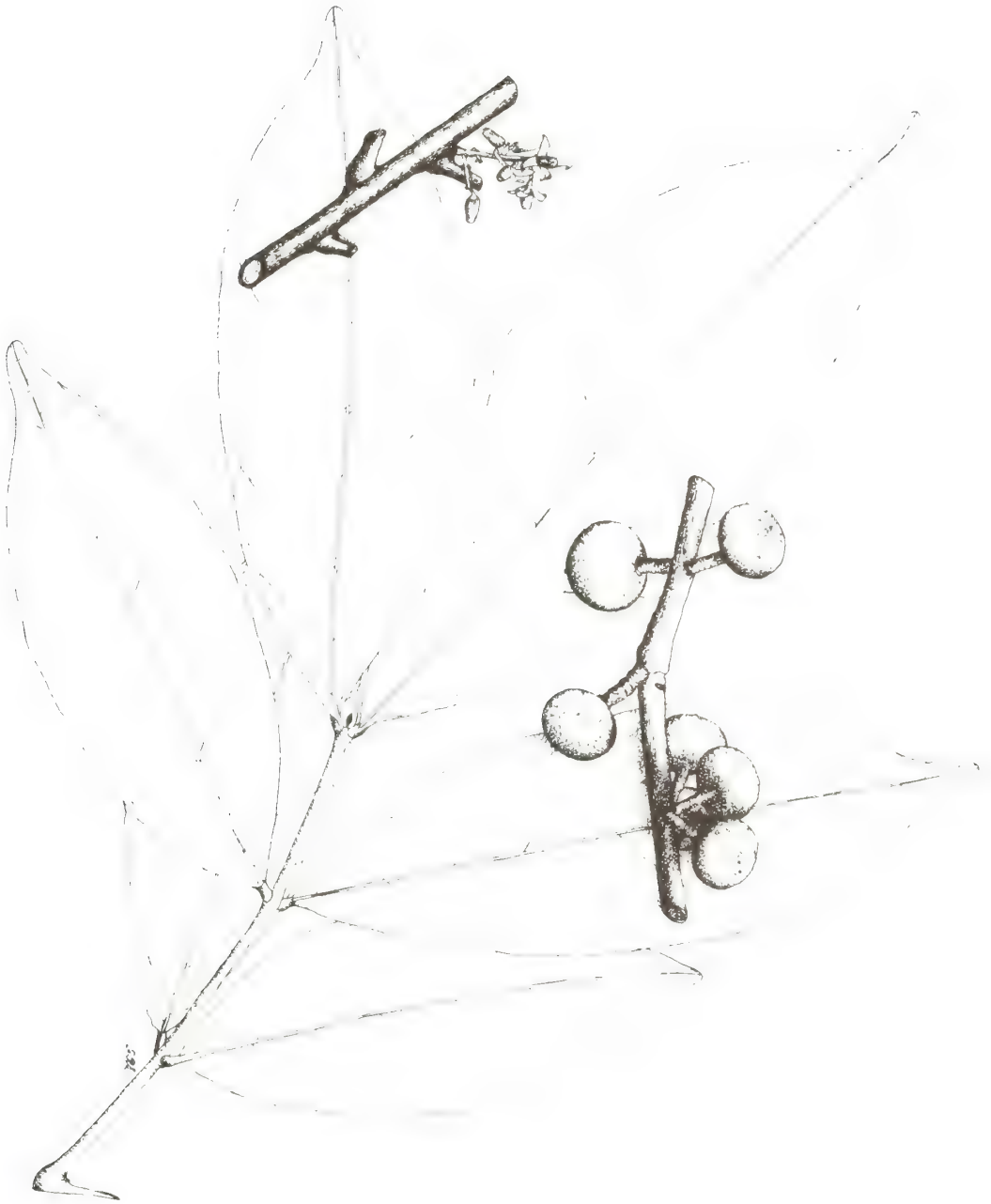
A. Leaves bipinnate, leaflets with toothed margins—110. Alelaila, chinaberry, *Melia azedarach* L.*
AA. Leaves pinnate.
B. Leaflets with toothed margins.
C. Leaflets many, thin, long-pointed—414. *Melia azadirachta.**
CC. Leaflets 3–7, thick and stiff, with 3 sharp spiny teeth at broad apex—416. *Trichilia triacantha.*
BB. Leaflets not toothed.
D. Leaflets of odd number (odd pinnate)—*Trichilia.*
E. Leaflets 3 or 5 (sometimes 7), asymmetrical, the end leaflet largest and lowest leaflets smallest; veins much sunken, causing a wrinkled appearance—114. Gaeta, *Trichilia pallida* Sw.
EE. Leaflets 7–21, symmetrical, about equal in size, veins slightly sunken—113. Tinacio, broomstick, *Trichilia hirta* L.
DD. Leaflets all paired (even pinnate), asymmetrical, slightly curved and unequal at base.
F. Axis of leaf continuing to grow and form additional pairs of leaflets; veins sunken; flowers and fruit 4-parted—*Guarea.*
G. Leaflets 2–8, mostly oblong—413. *Guarea ramiflora.*
GG. Leaflets 8–20, elliptic to oblong—109. Guaraguao, American muskwood, *Guarea guidonia* (L.) Sleumer (*G. trichilioides*).
FF. Axis of leaf not forming additional leaflets; veins not sunken; flowers and fruit 5-parted.
H. Leaflets 4–12.
I. Leaflets 2½–6 inches long—111. Caoba hondureña, Honduras mahogany, *Swietenia macrophylla* King.*
II. Leaflets 1–2½ inches long—112. Caoba dominicana, Dominican mahogany, West Indies mahogany, *Swietenia mahagoni* Jacq.*
HH. Leaflets 10–20 or more.
J. Leaflets lance-shaped; seeds winged at both ends; without distinctive odor—415. *Toona ciliata.**
JJ. Leaflets lance-shaped, oblong, or ovate; seeds with long wing; odor of garlic in flowers and crushed leaves—108. Cedro hembra, Spanish-cedar, *Cedrela odorata* L.

413. Guaraguadillo — *Guarea ramiflora* Vent.

Guaraguadillo is a small tree uncommon in understory of mountain forests of Puerto Rico and rare in Hispaniola. It is identified by: (1) even pinnate leaves with usually 1–4 pairs of mostly oblong leaflets and a growing point forming additional pairs; (2) small pink 4-parted flowers about ½ inch across, few to many clustered at leaf bases and on larger twigs back of leaves; and (3) round hard brown fruits ½–⅞ inch in diameter.

Evergreen shrub or small tree 25 feet high and 6 inches in trunk diameter, often flowering as a shrub 10 feet high and rarely a medium-sized tree to 50 feet and 6 inches, reported to reach 65 feet. The bark is gray or brown, smoothish with dots (lenticels), becoming fissured and scaly. Inner bark is pinkish or whitish, slightly bitter. The twigs are light brown with raised dots (lenticels) and large raised leaf scars, hairless.

The alternate leaves are 6–12 inches long, including the stout brownish woody hairless petiole 1½–3 inches long and axis elongating to 6 inches beyond. The budlike hairy growing point between last pair of leaflets continues to form additional pairs, sometimes 7–9, as the older ones are shed. The leaflets have stout curved brown stalks about ¼ inch long. Leaflet blades are mostly oblong or lance-shaped, 3–8 inches long and 1¼–3 inches wide, long-pointed at apex, short-pointed at base, sometimes slightly wavy edges, slightly thickened and leathery, with network of fine veins. The upper surface is dull dark green with the curved side veins sunken, hairless, and the lower surface



13. Guaraguadillo *Guarea ramiflora* Vent.

Flowers (above), leaf (below), fruits (center right), two-thirds natural size.

green with raised veins, hairless or slightly hairy on veins.

Flower clusters (racemes or panicles) are 1–3½ inches long at leaf bases and on larger twigs back of leaves, the branches finely hairy. Flower buds are ¼ inch long, deep pink. The fragrant flowers have a hairy stalk about 1/16 inch long; calyx of 4 finely hairy pointed sepals less than 1/16 inch long; corolla of 4 oblong pink petals ¼–5/16 inch long, spreading and curved back; stamen tube cylindric, pink, ¼ inch long, bearing 8 minute stalkless stamens at apex inside; and on a raised disk the pistil 3/16 inch long with egg-shaped hairless 4-celled ovary with 1 ovule in each cell, slender style, and rounded stigma.

The fruit on a stout stalk is a hard brown capsule, round or slightly flattened, which splits into 4 parts. There are 4 or fewer elliptic seeds 7/16 inch long, with reddish coat. With flowers and fruits through the year.

The sapwood is light brown or whitish and hard. If available in larger sizes, the wood should have similar uses as that of related species.

Uncommon and widely distributed in understory of moist limestone and upper and lower Cordillera and Luquillo forests of Puerto Rico at 200–3,000 feet but mostly at middle altitudes.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Toro Negro, Vega.

RANGE.—Puerto Rico and collected once in Hispaniola (Dominican Republic).

OTHER COMMON NAME.—guaraguao macho, guaraguaillo (Puerto Rico).

This species known from Puerto Rican mountains was named and illustrated in 1803. The specific name refers to the flowers along the branches.

414. Neem, margosa — *Melia azadirachta* L.*

Neem tree has been introduced for shade in Tortola and experimentally in Puerto Rico. Distinguishing characters are: (1) pinnate leaves 1 foot or more in length, with 9–15 lance-shaped leaflets paired except at end, very long-pointed at apex, very unequal or oblique at blunt base, and toothed on edges; (2) many small white fragrant flowers ⅜ inch across the 5 petals; and (3) light yellow elliptic fruits ½–⅝ inch long.

A medium-sized planted tree 30 feet or more in height and 1 foot in trunk diameter, with crown of dense foliage. Bark gray, with scaly plates, the inner bark pink and bitter. Twigs brown, hairless.

Leaves crowded near ends of branches, alternate pinnate, hairless, with slender light green axis. The leaflets are mostly 6–7 pairs with short stalks of about 1/16 inch, 2–3 inches long and ⅝–⅞ inch wide, often curved and with curved midrib nearer lower edge, thin, dull green above, and paler beneath.

Flower clusters (panicles) are 2–6 inches long, narrow and branched. The flowers are composed of 5 light green rounded calyx lobes, 5 white oblong rounded petals 3/16 inch long, 10 stamens united in a tube, and pistil with rounded ovary and slender style. The berrylike fruits (drupes) have bitter pulp and large elliptic stone. Flowering in spring.

Where native the wood is useful, the bark serves in home remedies, and an oil is obtained from the seeds.

Uncommon as a fast-growing attractive shade or ornamental tree in Tortola. Tested experimentally in Puerto Rico but still rare.

RANGE.—Native of India but planted elsewhere in the tropics.

OTHER COMMON NAMES.—neem (Virgin Islands, English); paraíso (Cuba).

BOTANICAL SYNONYM.—*Azadirachta indica* A. Juss.

414. Neme, margosa *Melia azadirachta* L.*

Flowering twig (above), fruit (lower right), two-thirds natural size.

415. Tun, Burma toon ***Toona ciliata* Roem.***

This large forest tree related to cedro hembra or Spanish-cedar has been introduced in forestry tests. It is identified by: (1) large even pinnate leaves with 10–20 mostly paired lance-shaped leaflets, slightly curved and unequal at base; (2) many small whitish flowers $\frac{3}{16}$ inch long in large branching clusters; and (3) oblong seed capsules $\frac{7}{8}$–$1\frac{1}{2}$ inches long, with many seeds winged at both ends.

A planted tree 25 feet and 8 inches in trunk diameter or larger, apparently deciduous. Twigs stout, hairless, with light-colored dots (lenticels) and large raised half-round leaf scars.

Leaves alternate, about $1\frac{1}{2}$ feet long, with round axis, hairless. Leaflets 3–6 inches long and 1–$2\frac{1}{4}$ inches wide, on slender stalks of $\frac{3}{8}$–$\frac{1}{2}$ inch, long-pointed at apex, short-pointed or rounded at base with sides unequal, margin sometimes slightly wavy, the midvein slightly curved and near edge toward twig, and the lower surface paler.

Flower clusters (panicles) large, much branched, bearing many short-stalked fragrant flowers. The calyx is 5-lobed, less than $\frac{1}{16}$ inch long; there are 5 oblong petals almost $\frac{1}{4}$ inch long; 5 stamens more than $\frac{1}{8}$ inch long on a hairy disklike base; and pistil with rounded slightly hairy 5-celled ovary, short style, and broad rounded flat stigma. Seed capsules dark brown, splitting into 5 parts from a large 5-angled axis. Seeds brown, flat and thin, $\frac{3}{4}$ inch long including wings at both ends. With flowers and fruits in summer.

The wood is suitable for cabinetwork and is resistant to dry-wood termites.

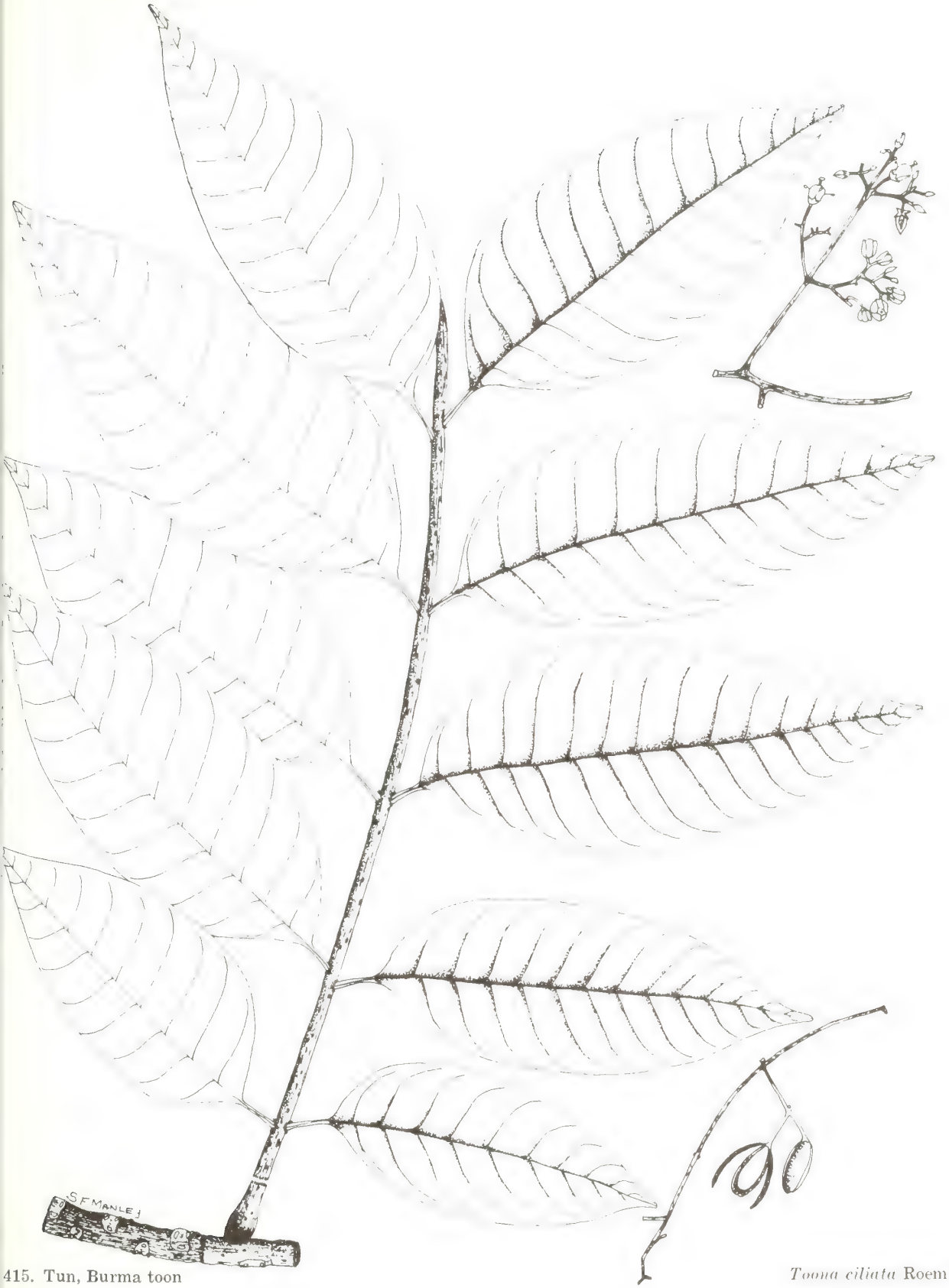
Rare in forestry tests in Puerto Rico, the growth not found satisfactory.

PUBLIC FORESTS.—Cambalache, Luquillo.

RANGE.—Native of Himalaya region of tropical Asia from India to China. Introduced elsewhere for forest plantations.

OTHER COMMON NAME.—cedro de Himalaya (Cuba).

BOTANICAL SYNONYM.—*Cedrela toona* Roxb.



415. Tun, Burma toon *Toona ciliata* Roem.*

Leaf, flowers (upper right), fruits (lower right), two-thirds natural size.

416. Bariaco ***Trichilia triacantha* Urban**

This rare spiny-leaf shrub or small tree known only from dry areas of southwestern Puerto Rico is easily recognized by the pinnate or almost palmate leaves with 3–7 small obovate or wedge-shaped leaflets each with 3 sharp spiny teeth at apex.

An evergreen shrub 5 feet high but also a small tree 15–30 feet high and 3 inches in trunk diameter. Twigs gray grown, slender, finely hairy when young. The bud consists of a minute hairy leaf.

The alternate leaves ¾–1¼ inches long, mostly clustered near ends of twigs, have a short hairy petiole about ⅛–¼ inch long and short hairy axis of about ⅛ inch, so short that they appear to be palmate or digitate. The 3–7 leaflets are paired except at end, almost stalkless, ⅜–1¼ inches long and 3/16–⅝ inch wide, broadest near the apex, which has 3 sharp spiny teeth 1/16–⅛ inch long and narrowed toward the long-pointed base, thick and stiff, the edges slightly rolled under, the many side veins in a fine network. The upper surface is shiny with sunken midvein, the lower surface dull and paler.

Flower clusters (like racemes or panicles) at ends of twigs are short. Flowers few, almost stalkless, hairy, white, about ⅛ inch broad, composed of short cup-shaped calyx with minute teeth; petals 5 or 4 less than ⅛ inch long, thick and finely hairy; stamens in a tube; and pistil with rounded ovary, shorter hairy style, and dotlike stigma. Fruits unknown. Collected with flower buds in October and with flowers in February.

It has been suggested that this species would be an attractive ornamental shrub in dry climates.

Rare near Guánica and Peñuelas in dry limestone forest at 100–200 feet altitude in southwestern Puerto Rico.

PUBLIC FOREST.—Guánica.

RANGE.—Known only from southwestern Puerto Rico.

OTHER COMMON NAME.—guayabacón (Puerto Rico).

The descriptive specific name means 3-spined. This distinct species has been placed in a separate section or even its own genus.

MALPIGHIA FAMILY (MALPIGHIACEAE)

Mostly woody vines, also shrubs and trees, known by: (1) leaves generally opposite, simple, mostly entire, often with pressed 2-pointed hairs attached at middle (often needlelike and stinging), frequently with glands at apex of petiole, generally with stipules; (2) flowers often showy and yellow or pink; usually along an axis (raceme), mostly bisexual, mostly regular, the calyx persistent with 5 sepals or lobes mostly with 2 glands on outside, corolla of 5 long-stalked rounded and fringed petals, 10 stamens (or partly staminodes) generally united at base, and pistil with superior ovary with usually 3 cells each with 1 ovule, and 3 styles; and (3) fruit winged (samara), capsule, berry, or drupe. Also vol. 1, p. 256.

Key to species

A. Flowers in terminal clusters.
  B. Petals yellow.
    C. Leaves partly reddish tinged, without glands at base; fruits (drupes) nearly round.
      D. Leaves thin, turning rich red upon drying, upper surface shiny, midrib lighter in color than blade—115. Maricao, *Byrsonima coriacea* (Sw.) DC.
      DD. Leaves leathery, with prominent veins, upper surface slightly shiny, lower surface with larger veins often rusty-red hairy—116. Maricao cimarrón, *Byrsonima crassifolia* (L.) H.B.K.
    CC. Leaves greenish, often with 2 yellow dot glands at base of lower surface; fruits (drupes) mostly 2-lobed—*Bunchosia*.
      E. Leaves oblong, light green, 1½–3 inches long and ½–1½ inches wide—418. *Bunchosia glandulosa*.
      EE. Leaves broadly ovate to elliptic, shiny green, 2–5½ inches long and 1¼–4 inches wide—417. *Bunchosia glandulifera*.
  BB. Petals white, pink, or red.
    F. Leaves spoon-shaped or obovate, hairless—419. *Byrsonima lucida*.
    FF. Leaves elliptic, the lower surface densely gray hairy—420. *Byrsonima wadsworthii*.

416. Bariaco *Trichilia triacantha* Urban

Leafy twig, natural size.

AA. Flowers in lateral clusters at leaf bases, petals white or pinkish—*Malpighia.*
- G. Leaves with 2-pointed stinging hairs beneath.
  - H. Leaves very narrow, linear or linear-oblong—424. *Malpighia linearis.*
  - HH. Leaves broader, mostly elliptic or oblong.
    - I. Leaves relatively large, 3–8 inches long.
      - J. Flowers few in stalked clusters; leaves mostly short-pointed or blunt at both ends—421. *Malpighia fucata.*
      - JJ. Flowers many in nearly stalkless clusters; leaves rounded or short-pointed at both ends sometimes notched at apex—427. *Malpighia shaferi.*
    - II. Leaves less than 3 inches long.
      - K. Leaves notched at base, the edges with stinging hairs—423. *Malpighia infestissima.*
      - KK. Leaves short-pointed or blunt at base, the edges without stinging hairs—425. *Malpighia pallens.*
- GG. Leaves becoming hairless.
  - L. Leaves blunt or rounded and often notched at apex—426. *Malpighia punicifolia.*
  - LL. Leaves short- to long-pointed at apex—422. *Malpighia glabra.*

417. Café falso, café forastero — *Bunchosia glandulifera* (Jacq.) H.B.K.

A rare small tree to 20 feet high and 4 inches in trunk diameter, characterized by: (1) opposite shiny green, broadly ovate to elliptic leaves 2–5½ inches long and 1¼–4 inches wide, short- to long-pointed at apex and blunt or rounded at base, sparsely hairy beneath, the petioles to ⅜ inch long, often with 2 glands near blade; (2) flowers with 5 yellow rounded stalked petals 5/16 inch long and with ovary and style hairy; and (3) egg-shaped red fleshy fruits (drupes), 2-lobed and about ½ inch in diameter. Flowering and fruiting in spring. Rare in lower Luquillo forest at 800–1,000 feet altitude on southwestern slopes of Luquillo Mountains only. PUBLIC FOREST.—Luquillo. RANGE.—Puerto Rico, Montserrat, Guadeloupe, Martinique, Trinidad, and from Venezuela to Peru. OTHER COMMON NAMES.—café forastero (Puerto Rico); prune café, bois café (Guadeloupe).

418. Café forastero — *Bunchosia glandulosa* (Cav.) L. C. Rich.

This shrub or small tree common in dry areas near coasts is characterized by: (1) opposite oblong hairless light green leaves 1½–3 inches long and ½–1½ inches wide, short-pointed or blunt at both ends, with 2 yellow dot glands at base or lower surface; (2) several flowers nearly ½ inch across the 5 spreading yellow stalked petals; and (3) fruits (drupes) egg-shaped, red or orange, ⅜–7/16 inch long, slightly 2-lobed.

Evergreen (or deciduous) shrub or small tree to 30 feet high and 6 inches in trunk diameter. The bark is gray, finely fissured, becoming rough. Inner bark is whitish, with a slight distinctive odor and taste suggesting raw potato. The twigs are slender, slightly hairy when young, light gray or light brown, with minute dots (lenticels), also similar odor and taste. End bud 1/16 inch long, covered with light brown hairs.

The opposite leaves have slender petioles ⅛–⅜ inch long. Blades are not toothed on edges, thin or slightly thickened, the upper surface light green and often slightly shiny, the lower surface dull light green.

Flower clusters (panicles) at ends of twigs are 1–2 inches long and branched. Flowers several on short slender hairy stalks, composed of calyx less than ⅛ inch long with 5 lobes and 10 glands; petals 5, ¼ inch long, deep yellow, rounded and wavy margined, stalked at base; 10 stamens united at base; and hairless pistil with 2-celled ovary, slender style, and 2-lobed stigma. The fruits (drupes) have calyx glands at base and style at apex and contain thin orange-red pulp and 2 large light brown stones, each 1-seeded. Recorded with flowers from May to October and with fruits from June to August.

The sapwood is light brown and hard.

Uncommon but widely distributed in dry and moist limestone forests near coasts and lower Cordillera (south slope) in southwestern and northwestern parts and northeastern corner of Puerto Rico and also other islands eastward from sea level to 500 feet altitude. Recorded from Icacos, Palominos, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, and Tortola.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Guánica, Río Abajo, Susúa, Vega, Estate Thomas; Buck Island Reef, Virgin Islands.

RANGE.—Bahamas, Hispaniola, Puerto Rico and Virgin Islands, and from St. Martin and St. Barts to Martinique, also in Yucatán, Mexico, and recorded from Amazonas, Brazil.

OTHER COMMON NAMES.—cafeíllo, yeso

18. Café forastero *Bunchosia glandulosa* (Cav.) L. C. Rich.

Fruiting twig (left), flowers (upper right), natural size.

(Puerto Rico); cabra, cabrita (Dominican Republic); bois poulette (Haiti).

Excluded species: *Bunchosia nitida* (Jacq.) DC. A shrub or small tree distinguished by: (1) opposite shiny elliptic, oblong, or lanceolate leaves 1½–6 inches long and ¾–2¾ inches wide, mostly short- to long-pointed at apex and short-pointed or blunt at base, becoming hairless, short-stalked; (2) several flowers about ⅝ inch across the 5 yellow rounded gland-toothed stalked petals more than ¼ inch long, with hairless pistil; and (3) egg-shaped yellow fleshy fruits (drupes) 2–3-lobed, ⅝ inch in diameter, containing 2–3 stones. Recorded long ago from near Guánica and Mayaguez in western Puerto Rico. However, these sterile specimens have now been identified as No. 418, café forastero, *B. glandulosa* (Cav.) DC. Also reported from St. Thomas more than a century ago. RANGE.—Cuba, Hispaniola, Lesser Antilles from Montserrat to Grenada and Barbados, also Colombia. OTHER COMMON NAMES.—bois senti, cabra (Hispaniola); chinkwood (The Grenadines).

419. Palo de doncella, Long Key byrsonima — *Byrsonima lucida* DC.

This shrub or small tree is recognized by: (1) opposite small spoon-shaped (spatulate) or obovate leaves ¾–2 inches long and ¼–⅞ inch wide, shiny blue green on upper surface; (2) flowers ½ inch across the 5 spreading stalked rounded petals that turn from white to red or yellow; and (3) round brown fleshy fruits ½ inch in diameter.

Evergreen shrub or small tree, becoming 25 feet high and 6 inches in trunk diameter, with widely spreading rounded or irregular crown. The gray bark is smooth, slightly warty (lenticels), becoming furrowed into plates and rough. Inner bark is pink and slightly bitter and fibrous. Twigs are gray, slender and short, hairless, with raised dots (lenticels).

The opposite leaves are rounded at apex and narrowed at base into a stalk 1/16 inch long, slightly turned under at edges, slightly thickened, hairless, the upper surface shiny blue green, and the lower surface dull yellow green.

Flower clusters (racemes) at ends of twigs are 1–2 inches long. Flowers few on slender hairy stalks, slightly fragrant, composed of calyx ⅛ inch long with 5 pointed lobes and 2 oblong glands at base outside; corolla of 5 petals ¼ inch long, rounded, wavy margined, and concave with stalk at base; stamens 10, separate; and pistil with 3-angled 3-celled ovary with 3 ovules and 3 slender styles. The fleshy edible fruits have calyx glands and the styles persistent. Within the flesh is a thick-walled stone containing 3 or fewer seeds. Flowering and fruiting intermittently through the year.

Sapwood is light brown, and heartwood dark brown. Elsewhere, the hard, heavy, fine-textured wood has been used for furniture.

This attractive plant merits cultivation as an ornamental shrub.

Scattered and locally common at low altitudes, mainly in dry coastal forest and lower south slopes of Cordillera from sea level to 2,000 feet altitude in southeastern and southwestern Puerto Rico. Also Mona, Culebra, Vieques, St. Croix, St. Thomas, St. John, and Anegada.

PUBLIC FORESTS AND PARKS.—Maricao, Susúa; Buck Island Reef, Virgin Islands.

RANGE.—Southern Florida including Florida Keys, Bahamas, Cuba, Hispaniola, Puerto Rico, Culebra, Vieques, Virgin Islands, and from Anguilla and Barbuda to Barbados.

OTHER COMMON NAMES.—aceituna, sangre de doncella, maricao (Puerto Rico); gooseberry (Anegada); doncella (Dominican Republic); carne de doncella, sabica de costa (Cuba); locust-berry, guana-berry, candle-berry (Bahamas); Long Key byrsonima, locust-berry (United States).

BOTANICAL SYNONYM.—*Byrsonima cuneata* (Turcz.) P. Wils.

Byrsonima ophiticola Small, described from serpentine slopes, Guanajibo, near Mayaguez, and collected also at San Germán, has larger, yellowish petals turning to red and apparently is a hybrid with No. 115, maricao, *B. coriacea* (Sw.) DC., or a variation of this species *B. horneana* Britton & Small, also from Guanajibo, has obovate leaves 1¼–3½ inches long and ⅝–1¾ inches wide and light yellow petals fading reddish and may be another hybrid or a variation of *B. coriacea*.

19. Palo de doncella, Long Key byrsonima *Byrsonima lucida* Sw.

Flowering twig (above), fruiting twig (below), natural size.

420. Almendrillo ***Byrsonima wadsworthii* Little**

This rare tree known only from high altitudes in Puerto Rican mountains is distinguished by: (1) opposite small elliptic leaves, thick and turned under at edges, the lower surface densely gray hairy; (2) flowers nearly ½ inch across the 5 spreading white to pink stalked petals, several in terminal clusters; and (3) egg-shaped fleshy stone fruits nearly ½ inch long, pink or red.

Small to medium-sized evergreen tree 15–45 feet high and to 8 inches in trunk diameter, much branched, with compact dense crown, broad to narrow, of dark green foliage. The bark is brown or dark brown, with many small fissures or slightly furrowed. Inner bark is red streaked in outer part and pinkish beneath, bitter. Twigs gray, with dense pressed hairs, becoming hairless and fissured.

Leaves opposite, with thick gray hairy petioles ⅛–⅜ inch long and with hairy pointed stipules less than ⅛ inch long, united at base. Leaf blades are elliptic, 1½–3 inches long and 1–1½ inches wide, slightly notched or blunt at apex, rounded or short-pointed at base, the upper surface green or dark green, slightly shiny, becoming nearly hairless, the midvein and 4–6 pairs of side veins slightly sunken.

The unbranched flower clusters (racemes) 1¼–2¾ inches long at ends of twigs bear several flowers on slender stalks less than ⅜ inch long. Flowers are composed of 5 pointed brown hairy sepals 3/16 inch long bearing 2 minute oblong glands at base; 5 spreading petals nearly ¼ inch long, rounded and finely toothed and with narrow stalk, white but turning pink; 10 stamens; and pistil with hairy 3-angled 3-celled ovary and 3 slender styles. The fruits (drupes) with calyx at base have thin flesh and large whitish 3-celled stone ¼ inch long containing 3 seeds 3/16 inch long. Flowering from June to August and intermittently and maturing fruit in September and October.

The wood is light brown and hard.

Almendrillo is distributed in the upper Cordillera, upper Luquillo, and dwarf forests on ridges along the mountain summits mostly at 2,500–3,000 feet altitude, sometimes as low as 1,800 feet and above 4,000 feet on the highest peaks. It is rare and scattered, most common in Luquillo Mountains but present also in central and western high mountains.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from high mountains of Puerto Rico.

OTHER COMMON NAME.—maricao (Puerto Rico).

This species of high altitudes was not found by the early collectors. The first botanical collection was by Claud L. Horn of the Forest Service in 1934. The scientific name honoring the director of the Institute of Tropical Forestry was published in 1953 (*48*).

420. Almendrillo *Byrsonima wadsworthii* Little

Flowering twig (above), fruiting twig (lower right), natural size.

421. Palo bronco ***Malpighia fucata*** **Ker**

This shrub or small tree with stinging needlelike hairs flat on lower leaf surfaces is native in eastern Puerto Rico. It is recognized by: (1) many yellowish needlelike hairs about ¼ inch long, attached at middle and 2-pointed, flat on lower leaf surfaces; (2) opposite leaves of varying shape, mostly oblong, elliptic or lance-shaped, larger than in related species; (3) many flowers in stalked clusters at leaf bases, about ¾ inch across the 5 spreading white or pink rounded petals fringed at edges and stalked at base; and (4) rounded red fleshy fruits about ⅝ inch in diameter.

Evergreen shrub or small tree to 20 feet high and 3 inches in trunk diameter. Twigs slender, light brown, with flat pressed hairs when young.

The opposite leaves have short leafstalks ⅛–⅜ inch long. Blades are 3–8 inches long and 1–4½ inches wide, mostly short-pointed or blunt at both ends, slightly thickened and slightly turned under at edges. The upper surface is green and hairless, and the lower surface paler and with many needlelike hairs.

Flower clusters (cymes) have many flowers on stalks ½–¾ inch long at the end of a short stalk at leaf base. The flowers consist of 5 sepals more than ⅛ inch long each with 2 oblong glands; 5 slightly unequal stalked white or pink petals about ⅜ inch long, 10 stamens, and pistil with 3-celled ovary and 3 styles enlarged at apex. The fruits (drupes) have thin flesh and large stone with many vertical ridges. With flowers and fruits intermittently during the year.

This species is uncommon in lower Luquillo and moist coastal forests from sea level to 1,800 feet altitude in northeastern and southeastern Puerto Rico. Also Vieques and St. Thomas. An old report from St. Croix may refer to a related species afterwards named as distinct.

PUBLIC FOREST.—Luquillo.

RANGE.—Cuba, Jamaica, and Puerto Rico.

OTHER COMMON NAME.—olaga (Puerto Rico).

421. Palo bronco *Malpighia fucata* Ker

Two-thirds natural size.

422. Huesito ***Malpighia glabra* L.***

This shrub or small tree of St. Croix and St. Thomas, apparently introduced though recorded as native, is a close relative of No. 426, acerola or West-Indian-cherry, *Malpighia punicifolia* L.,* and has been confused with the latter. Distinguishing characters are: (1) paired lanceolate, elliptic, or ovate leaves $1\frac{1}{4}$–$2\frac{1}{2}$ inches long and $\frac{1}{2}$–1 inch wide, hairless or nearly so; (2) few flowers at leaf bases, about $\frac{5}{8}$ inch across the 5 pink rounded wavy-edged stalked petals; and (3) round red fruits $\frac{3}{8}$ inch or more in diameter, slightly flattened, scarlet red, and edible.

An evergreen much-branched shrub or small tree to 15 feet or more in height with smoothish gray bark.

The opposite leaves have short petiole less than $\frac{1}{8}$ inch long. Blades are long- to short-pointed at apex, short-pointed to rounded at base, not toothed on edges, thin, hairless or nearly so, shiny green on upper surface and paler beneath.

Flower clusters (cymes) are composed of few flowers on slender stalks of $\frac{1}{8}$–$\frac{5}{8}$ inch long. The calyx has 5 lobes, each with 2 glands at base; the 5 petals are about $\frac{5}{16}$ inch long; there are 10 stamens; and the pistil has 3-celled ovary and 3 styles. The fruits with calyx at base have sour flesh and 1–3 stones.

Grown elsewhere as an ornamental, in hedges, and for the edible sour cherrylike fruits.

Recorded from St. Croix and St. Thomas but not from Puerto Rico.

RANGE.—Cuba, Jamaica, Hispaniola, Virgin Islands (apparently introduced), Guadeloupe, and Martinique. Also widespread in continental tropical America from southern Mexico to Venezuela, Bonaire and Curacao, and Peru, the range perhaps extended by cultivation.

OTHER COMMON NAMES.—cereza, cerezo (Spanish); cereza del país (Cuba); escobillo, manzanita (Mexico); acerola, nance, panecito, acerolata (Guatemala); camaroncito (El Salvador); acerola, júpiter (Costa Rica); cerezo de Castilla (Panama); cerecito, cereza de monte, huesito (Colombia); semeruco (Venezuela); sanango (Peru); wild cherry (Jamaica); wild craboo (British Honduras); cherry (St. Barts); shimarucu machu (Bonaire, Curacao).

422. Huesito *Malpighia glabra* L.*

Flowers (upper right) and leafy twig, natural size.

423. Cowhage-cherry ***Malpighia infestissima*** **(A. Juss.) A. Rich.**

This shrub or small tree with stinging needlelike hairs is known only from the islands east of Puerto Rico and Maguey Island near Parguera in southwestern part. It is identified by: (1) yellowish needlelike hairs 1/8 inch or less in length, mostly attached at middle and 2-pointed, on edges and surfaces of leaves and on young twigs; (2) opposite elliptic or ovate leaves, dull light green, mostly notched at base and rounded or blunt or notched at apex; (3) flowers few at leaf bases, about 3/4–1 inch across the 5 spreading white or pinkish rounded petals fringed at edges and stalked at base; and (4) egg-shaped red fleshy fruits about 5/8 inch in diameter.

Evergreen shrub or small tree to 15 feet high. The bark is gray, rough, and furrowed, the inner bark brownish. The slender twigs are light green, turning to brown, with small bristly hairs.

The opposite leaves have short hairy leafstalks less than 1/8 inch long. Blades are mostly 1 1/4–3 inches long and 3/4–2 inches wide (recorded to 4 3/4 inches long and 3 1/4 inches wide), thin, not toothed at edges, paler beneath. The needlelike hairs project along the edges and lie flat against lower surface, while the upper surface has shorter spreading hairs.

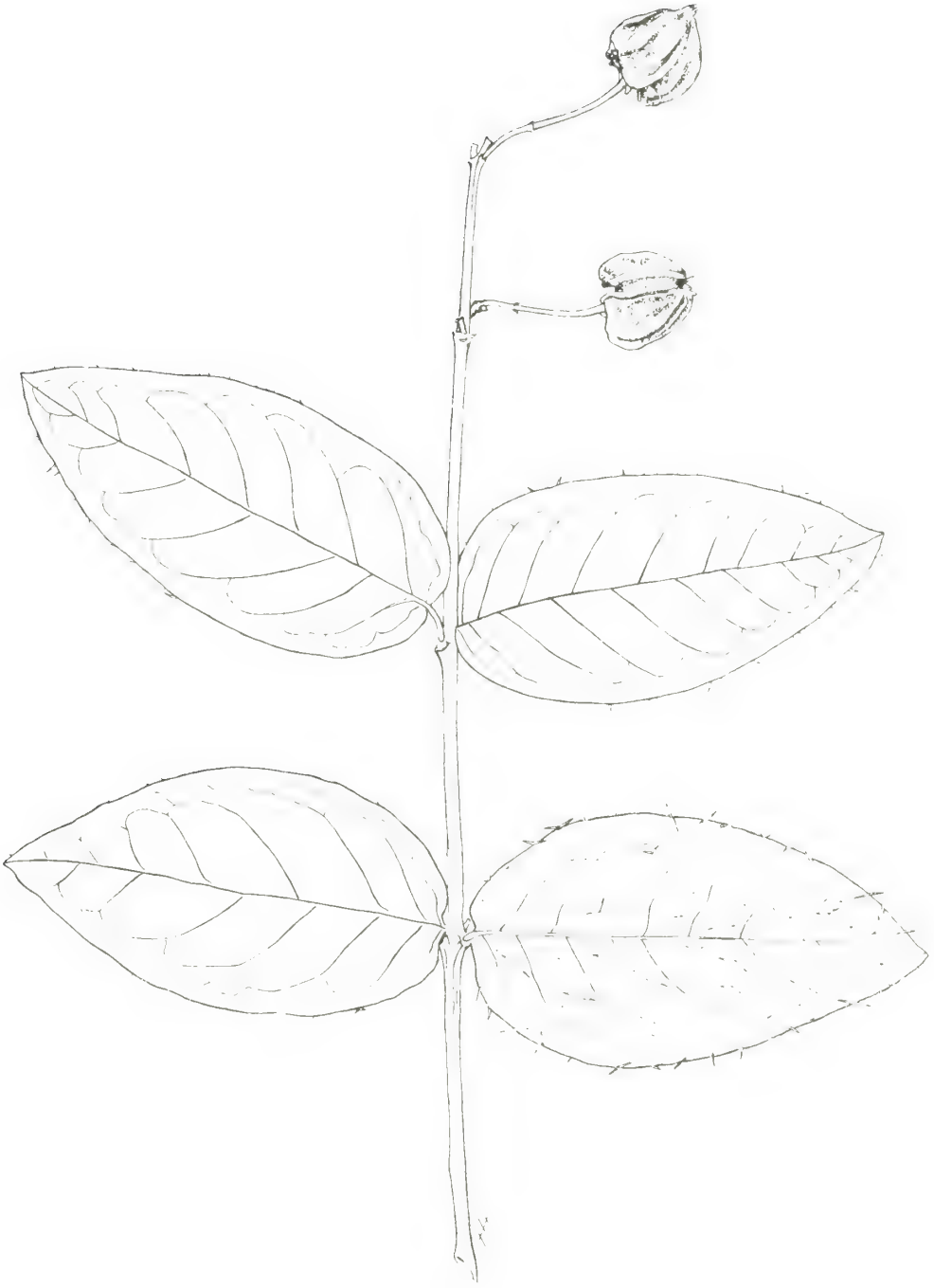
Flower clusters (cymes) are composed of a few short-stalked flowers at the end of a short stalk. The flower has 5 sepals more than 1/8 inch long, 5 white or pinkish petals 3/8–1/2 inch long, 10 stamens, and pistil. The fruits (drupes) have a large angled stone. Flowering from spring to fall and maturing fruits from summer to winter.

This species is locally common in the seasonal deciduous forest and open areas of coastal hills from sea level to 300 feet altitude in Vieques, Culebra, Water Island, St. Thomas, St. John, Virgin Gorda, and Anegada. Also Maguey Island near Parguera in southwestern Puerto Rico. It was discovered at St. Thomas and was named in 1845.

PUBLIC FOREST AND PARK.—Boquerón (?); Virgin Islands.

RANGE.—Maguey Island, Vieques, Culebra, and Virgin Islands.

This local species, like another at St. Croix, may have originated from No. 421, palo bronco, *Malpighia fucata* Ker, a larger leaved relative of moist forests in eastern Puerto Rico.



423. Cowhage-cherry *Malpighia infestissima* (A. Juss.) A. Rich.

Fruiting twig, natural size.

424. Stingingbush ***Malpighia linearis* Jacq.**

Stingingbush, the English name in the Virgin Islands, properly describes this shrub or small tree of the smaller islands but absent from Puerto Rico. Distinguishing characters are: (1) 2-pointed needlelike stinging hairs flat against lower surface of leaves; (2) leaves opposite, very narrow, linear or linear-oblong; (3) flowers about ⅝ inch across the 5 rounded fringed white or purplish petals, stalked and spreading; and (4) red, rounded, fleshy fruits about ⅜ inch in diameter.

Evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter. Leaves opposite, 1½–4 inches long and only ⅛–⅝ inch wide, abruptly long-pointed at apex, short-pointed at base, not toothed on edges, hairless on upper surface, with short petioles less than ⅛ inch long.

Flower clusters (cymes) long-stalked at leaf bases. Calyx composed of 5 lobes, each with 2 glands; corolla of 5 rounded fringed stalked white or purplish petals more than ¼ inch long; stamens 10, united in tube at middle; and pistil with 3-celled ovary and 3 styles. The fleshy fruits (drupes) have calyx persistent at base. With flowers in spring and fall and with fruits from summer to winter.

Uncommon in dry forest of coastal hills up to 300 feet altitude on Piñeros Island, Vieques, and Culebra east of Puerto Rico. Also St. Thomas, Water Island, St. John, and Anegada in Virgin Islands.

PUBLIC PARK.—Virgin Islands.

RANGE.—Piñeros, Vieques, Culebra, Virgin Islands, and from St. Martin and St. Barts to Montserrat. Also in eastern Cuba.

OTHER COMMON NAMES.—stinging-cherry (St. Barts); bois royal (French).

BOTANICAL SYNONYM.—*Malpighia angustifolia* L.

424. Stingingbush *Malpighia linearis* Jacq.

Flowering twig (left), twig with immature fruits (right), natural size.

425. Stingingbush ***Malpighia pallens* Small**

This shrub or small tree with stinging needlelike hairs flat on lower leaf surfaces is confined to St. Croix and adjacent Buck Island. Its distinguishing characters are: (1) yellowish needlelike hairs $\frac{1}{4}$–$\frac{5}{16}$ inch long, attached at middle and 2-pointed, flat on lower leaf surfaces; (2) opposite oblong or elliptic leaves $1\frac{1}{4}$–3 inches long and $\frac{1}{2}$–$1\frac{3}{4}$ inches wide, light green, dull or slightly shiny, rounded to blunt or short-pointed at apex and short-pointed or blunt at base; (3) flowers few at leaf bases, about $\frac{3}{4}$ inch across the 5 spreading rounded petals fringed at edges and stalked at base; and (4) rounded red fleshy fruits about $\frac{5}{8}$ inch in diameter.

Evergreen shrub or small tree to 20 feet high and often with several trunks to 3 inches in diameter. Bark gray, finely fissured or in irregular plates. Twigs slender, light green and with flat hairs when young, becoming light gray, with raised whitish dots (lenticels), becoming slightly fissured. The buds are composed of minute hairy leaves.

Leaves opposite, with short leafstalks $\frac{1}{16}$–$\frac{1}{8}$ inch long and with minute hairy stipules. The blades are thin, not toothed at edges, the lower surface paler and with inconspicuous large needlelike hairs.

Flower clusters (cymes) have a few short-stalked flowers at the end of a slender stalk $\frac{3}{4}$–$1\frac{1}{2}$ inches long. The flowers have calyx of 5 sepals each with 2 oblong glands; 5 spreading rounded fringed petals stalked at base; 10 stamens, those opposite the petals longest; and pistil with ovary and 3 hooked styles. Flowering in spring and summer and with fruits in summer.

This local species is known only from beach forests and coastal hills from sea level to 300 feet altitude at St. Croix including nearby Buck Island, where it is common locally.

PUBLIC PARK.—Buck Island Reef.

RANGE.—Known only from St. Croix and Buck Island. Recorded also from Cuba, but Cuban specimens seem distinct.

A person touching the foliage of this species accidentally will suddenly feel pain and discover yellow needles sticking in his hands and fingers. It may take awhile to discover the source of the needles.

This very restricted species apparently evolved from its close relative with large leaves of moist forests in eastern Puerto Rico, No. 421, palo bronco, *Malpighia fucata* Ker.

425. *Malpighia pallens* Small

Flowering twig (above), fruiting twig (below), natural size.

426. Acerola, West-Indian-cherry ***Malpighia punicifolia* L.***

Acerola, a shrub or small tree, is planted occasionally for its slightly sour edible fruit. It is identified by: (1) rounded red or scarlet fleshy fruits ⅜–¾ inch in diameter, like cherries but slightly flattened, on short stalks at leaf bases; (2) opposite elliptic leaves ¾–2½ inches long and ½–1½ inches wide, blunt, rounded, or slightly notched at apex; and (3) flowers on short stalks at leaf base, about ¾ inch across the 5 spreading pink stalked and fringed petals.

Evergreen shrub about 8 feet high or sometimes a small tree to 20 feet high and 4 inches in trunk diameter. The bark is brown or gray and smooth, with light brown dots (lenticels). The twigs are gray, ringed at nodes, with whitish dots (lenticels), hairless.

The opposite leaves have short leafstalks 1/16–⅛ inch long. Blades are mostly blunt at base, not toothed on edges, thin, hairless or nearly so, the upper surface slightly shiny green, and the lower surface dull light green.

The flowers are few or 1 at base of a leaf on short slender hairy stalks about ¼ inch long. Parts of a flower are the calyx of 5 pointed greenish hairy sepals 1/16 inch long, each with 2 oblong green glands at base; 5 spreading pink petals about 5/16 inch long, rounded and fringed, with narrow stalk at base; 10 stamens united into tube at base; and pistil with short ovary and 3 styles. The fruits (drupes) are rounded but slightly flattened, with calyx persistent at base and styles at apex, slightly sour edible pulp, and large rounded stone 3-celled and 3-seeded. With flowers and fruits from spring to fall.

The fruits, eaten raw and in preserves, are one of the richest sources of the essential vitamin C. Vitamin pills have been made from the pressed dried fruit pulp. The common name cherry is suggested by the resemblance of the fruit to the cultivated cherry of temperate climates. The latter is not related botanically, belonging to species of *Prunus* in the rose family (Rosaceae).

Acerola is planted occasionally both for fruit and ornament and sometimes escapes from cultivation in Puerto Rico and the Virgin Islands and may be naturalized locally. Recorded from St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC PARK.—Virgin Islands.

RANGE.—Jamaica and from St. Martin and St. Barts to Barbados and Trinidad. Also southern Mexico, British Honduras, Guatemala, and Honduras and northern South America from Colombia to Venezuela, Dutch Antilles, Ecuador, and Peru. Planted elsewhere in the tropics of both hemispheres.

OTHER COMMON NAMES.—cereza, cereza colorada (Puerto Rico); West-Indian-cherry, Barbados-cherry, cherry (Virgin Islands, English); cereza, cerezo (Spanish); guayacté (Mexico); grosella (Panama); semeruco (Venezuela); cerisier, cerise de St. Domingue (Haiti); cherry (Jamaica, The Grenadines); cherry, shimarucu (Dutch Antilles).

Malpighia thompsonii Britton & Small was named as a new shrub species from St. Croix, related to *M. punicifolia* but larger in leaves, fruits, and other parts and with more flowers. This shrub, perhaps a tetraploid, has been reduced to a horticultural variety of the latter.

427. ***Malpighia shaferi* Britton & Wils.**

An evergreen shrub 6–8 feet high or sometimes a small tree to 20 feet or more in height and 4 inches in trunk diameter. Identified by: (1) opposite leaves with petioles of ⅜–½ inch, oblong to elliptic or lanceolate, 5–6½ inches long and 1¾–3¼ inches wide, short-pointed, rounded, or sometimes notched at apex, rounded or short-pointed at base, turned under at edges with network of veins above and with pressed needlelike "stinging" hairs beneath; (2) many flowers in nearly stalkless cluster (cyme) on stalks of ⅛–¼ inch at leaf base, more than ½ inch wide, composed of 5 sepals less than ⅛ inch long, 5 stalked pink petals ⅜ inch long, 10 stamens, and pistil; and (3) fruits (drupes) red, fleshy. Grown as a rootstock for the related species No. 426, or West-Indian-cherry (*Malpighia punicifolia* L.). RANGE.—Vieques, first collected near Isabel Segunda; also coastal thickets at Maunabo, Puerto Rico. Not known elsewhere. Discovered in 1914 by John Adolph Shafer (1863–1918), botanist of the United States who made large collections in Puerto Rico and Cuba.

426. Acerola, West-Indian-cherry *Malpighia punicifolia* L.*

Twig with immature fruits (upper left), flowering twig (below), fruits (lower right), natural size.

MILKWORT FAMILY (POLYGALACEAE)

Herbs, shrubs, and small trees, known by: (1) leaves mostly alternate, simple, mostly without stipules; (2) flowers solitary or in unbranched clusters (like spikes or racemes); bisexual, irregular, composed of irregular persistent calyx of 5 sepals, the 2 inner largest and often winged or colored like petals, corolla of 3 (sometimes 5) unequal petals slightly united at base, the lowest often concave with a fringed crest (keel), stamens mostly 8 and united into a tube split on side and pistil with superior ovary mostly 2-celled with axile placentation and 1 ovule in each cell and slender curved style; and (4) fruit a capsule with 2 or 1 cells and seeds. Also vol. 1, p. 260.

Key to species

A. Leaves elliptic, 2–5 inches long, with many fine nearly parallel side veins; flowers showy, violet, ¾ inch across —117. Violeta, violet-tree, *Polygala cowellii* (Britton) Blake.

AA. Leaves obovate, ⅝–1¼ inches long, with few veins; flowers minute, whitish or greenish, ⅛ inch long—428. *Polygala penaea.*

428. *Polygala penaea* L.

This shrub or small tree of dry forests is identified by: (1) small obovate leaves ⅝–1¼ inches long and ¼–⅝ inch wide, thick and stiff, slightly rough on upper surface, and curved under at edges; (2) minute whitish or yellowish flowers ⅛ inch long and slightly irregular; and (3) seed capsules flat, heart-shaped, orange or orange brown, about ¼ inch long, 2- or 1-celled.

An evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter, reported to reach 20 feet and 6 inches in diameter. Bark dark gray, smoothish, slightly fissured. Twigs long and slender, with minute hairs, green, turning to light gray.

Leaves alternate, with short slender hairy petioles 1/16 inch long, rounded at apex and gradually narrowed to base, curved under at edges, the side veins inconspicuous, the upper surface green, rough hairy, and slightly shiny, and the lower surface dull green and slightly rough hairy.

Flower clusters (racemes) are ⅜–1 inch long at leaf bases. Flowers several, composed of calyx of 5 minute greenish sepals; corolla of 3 unequal petals to ⅛ inch long including 2 wing and keel; 8 stamens united into tube split open on 1 side; and pistil with hairy 2-celled 2-ovuled ovary and curved style. Seed capsules flattened and heart-shaped, minutely hairy, 2-celled or with only 1 cell developing. Seed 1 in each cell, 3/16 inch long, black, in orange cover (aril). Flowering irregularly during the year.

Uncommon and local on dry coastal hills and in moist forest to 2,000 feet altitude in southwestern Puerto Rico. Also Virgin Gorda.

PUBLIC FORESTS AND PARK.—Guánica, Maricao, Susúa; Gorda Peak.

RANGE.—Hispaniola, Puerto Rico, and Virgin Gorda.

OTHER COMMON NAMES.—crevajosa, guayacancillo, quiebrahacha (Dominican Republic); petit buis (Haiti).

BOTANICAL SYNONYMS.—*Polygala portoricensis* (Britton) Blake, *Badiera portoricensis* Britton, *B. penaea* (L.) DC.

A related species described from Puerto Rico, *Polygala portoricensis,* is treated here as a synonym. The differences in flower cluster and hairiness of seed capsule are minor and inconstant.

428. *Polygala penaea* L.

Flowering twig (left), fruiting twig (right), natural size.

SPURGE FAMILY (EUPHORBIACEAE)

Shrubs and trees, few herbs, known by: (1) often with whitish poisonous sap or latex; (2) leaves generally alternate, mostly simple, sometimes pinnate or digitate, usually with stipules often in form of glands; (3) flowers male and female mostly on the same plant (monoecious), generally small or minute and greenish, in various specialized clusters (commonly cymes), mostly regular, often much reduced; (4) flowers composed mostly of 5 sepals or none, generally without petals or up to 5, the male flowers with stamens the same number or twice as many as petals (when present) or reduced to 1 or many, and with disk or glands, the female flowers with superior ovary usually composed of 3 cells each with 1–2 ovules, generally 3 styles and 3 or 6 stigmas; and (5) fruit usually a capsule opening in 3 parts each 1-seeded, sometimes a drupe, the seeds generally with a fleshy protuberance (caruncle). Also vol. 1, p. 262.

Key to species

A. Stems fleshy or succulent, green; leaves minute and shedding early or fleshy; white latex abundant, poisonous and irritating to skin; introduced ornamentals—*Euphorbia.*
  B. Leaves minute and usually absent.
    C. Stems 3-angled, with paired spines along raised edges or ridges—441. *Euphorbia lactea.**
    CC. Stems cylindrical, pencillike—443. *Euphorbia tirucalli.**
  BB. Leaves thick, narrowly obovate or oblong, mostly 3–5 inches long—442. *Euphorbia neriifolia.**
AA. Stems not succulent.
  D. Leaves 2 or more at enlarged ringed nodes; white latex poisonous and irritating.
    E. Leaves ovate or rounded, with long slender petioles.
      F. Leaves 3–8 at node, blades ⅜–¾ inch long and broad—122. Rascaso, *Euphorbia petiolaris* Sims.
      FF. Leaves 3 or 2 at node, blades 2–5 inches long—440. *Euphorbia cotinifolia.**
    EE. Leaves very narrow, narrowly oblong, almost stalkless, 2 at node—432. *Chamaesyce articulata.*
  DD. Leaves alternate; nodes mostly not ringed or enlarged.
    G. Leaves with 3 or more main veins from base.
      H. Petiole attached above base of blade.
        I. Leaves ovate, not lobed or with 3–5 angles or shallow lobes—445. *Jatropha hernandiifolia.*
        II. Leaves starlike, with mostly 7 or 9 long-pointed lobes bordered by irregular gland-tipped teeth—448. *Ricinus communis.**
      HH. Petiole attached at base of blade.
        J. Leaves palmately lobed.
          K. Leaves deeply divided into 5, 7, or more lobes, and these into smaller lobes, coarsely toothed.
            L. Lobes 7 or 5; stinging hairs on twigs and flower stalks—433. *Cnidoscolus aconitifolius.**
            LL. Lobes 11 or fewer; stinging hairs not present—446. *Jatropha multifida.*
          KK. Leaves divided into 3 or 5 lobes, not toothed, broadly ovate.
            M. Leaves straight at base, with 3 or 5 long-pointed lobes—431. *Aleurites moluccana.**
            MM. Leaves deeply notched at base, with 3–5 blunt lobes—444. *Jatropha curcas.**
        JJ. Leaves toothed on edges but not lobed.
          N. Leaves with coarsely saw-toothed edges and 2 straight lateral veins from rounded base—118. Achiotillo, *Alchornea latifolia* Sw.
          NN. Leaves with inconspicuously wavy-toothed edges and 2 curved veins from short-pointed base—119. Palo de gallina, *Alchorneopsis portoricensis* Urban.
    GG. Leaves with 1 main vein or midrib.
      O. Spines present.
        P. Spines on edges and at apex of stiff oblong or elliptic leaves—438. *Drypetes ilicifolia.*
        PP. Spines on twigs.
          Q. Leaves large, 5–8 inches long, heart-shaped, long-pointed; large tree with spines also on trunk—125. Molinillo, sandbox, hura, *Hura crepitans* L.
          QQ. Leaves small, less than 1¼ inches long, obovate or elliptic, rounded at apex; small tree or shrub.
            R. Leaves ¾–1¼ inches long; twigs whitish gray with stout gray spines—429. *Adelia ricinella.*
            RR. Leaves ¼–⅝ inch long; twigs brown or gray, much branched, zigzag, with many slender spines—452. *Securinega acidoton.*

OO. Spines none.
S. Leaves with tiny dotlike scales or dense hairs.
T. Leaves with dotlike brown scales.
U. Leaves slightly thickened, rounded or blunt-pointed at both ends, petiole usually reddish tinged—126. Cedro macho, *Hyeronima clusioides* (Tul.) Muell.-Arg.
UU. Leaves thick and leathery, short-pointed at both ends, petiole silvery brown—120. Sabinón, *Croton poecilanthus* Urban.
TT. Leaves with dense hairs.
V. Leaves covered with whitish star-shaped hairs, mostly without teeth on edges.
W. Leaves with midvein and paired dotlike glands at base of blade, the petioles with orange or rusty-colored hairs—434. *Croton astroites.*
WW. Leaves with 5 or 7 veins and no glands at base of blade, the petioles with whitish hairs—435. *Croton rigidus.*
VV. Leaves with unbranched hairs, greenish, with wavy teeth on edges—430. *Bernardia dichotoma.*
SS. Leaves without scales, hairless or with minute inconspicuous hairs.
X. Leaves with petiole mostly more than 1 inch long, blades finely wavy toothed; sap milky, abundant, irritating.
Y. Leaves elliptic, with raised dot gland at base of midrib—124. Manzanillo, manchineel, *Hippomane mancinella* L.
YY. Leaves mostly oblong, with 2 raised dot glands at upper end of petiole—*Sapium.*
Z. Leaves with curved side veins—449. *Sapium caribaeum.*
ZZ. Leaves with many straight, parallel lateral veins almost at right angle to midrib.
a. Leaves abruptly short-pointed at apex—129. Tabaiba, *Sapium laurocerasus* Desf.
aa. Leaves abruptly long-pointed at apex—450. *Sapium jamaicense.*
XX. Leaves with short petiole less than ¾ inch long; sap mostly watery.
b. Leaves broadest beyond middle, often with a few teeth toward apex.
c. Leaves narrowed to blunt base—123. Yaití, oysterwood, *Gymnanthes lucida* Sw.
cc. Leaves narrowed to very long-pointed base—436. *Ditta myricoides.*
bb. Leaves broadest below or near middle, without teeth (except No. 437).
d. Leaves in more than 2 rows, almost stalkless, the petioles 1/16 inch long and slender twigs with minute hairs—451. *Savia sessiliflora.*
dd. Leaves in 2 rows, with petioles more than ⅛ inch long, the petioles and twigs mostly hairless.
e. Leaves many along slender deciduous twigs and appearing to be pinnate.
f. Leaves 2–6 inches long; seed capsules nearly ½ inch in diameter—447. *Phyllanthus juglandifolius.*
ff. Leaves 1–3 inches long; berries rounded and 8- or 6-angled, ¾–⅞ inch in diameter, light yellow, edible but sour—127. Grosella, Otaheite gooseberry-tree, *Phyllanthus acidus* (L.) Skeels.*
ee. Leaves several, not appearing to be pinnate.
g. Leaves thin and hanging down, elliptic and equal at base, dull green above and pale whitish green beneath—128. Millo, *Margaritaria nobilis* L. f. (*Phyllanthus nobilis*).
gg. Leaves slightly thickened, unequal or oblique at base.—*Drypetes.*
h. Leaves with wavy toothed edges; fruit (drupe) elliptic, more than ⅜ inch long, whitish—437. *Drypetes alba.*
hh. Leaves without teeth on edges.
i. Petiole ⅜–¾ inch long; fruit (drupe) elliptic, ⅝ inch long, whitish—121. Varital, *Drypetes glauca* Vahl.
ii. Petiole ¼–⅜ inch long; fruit (drupe) egg-shaped, ½–⅝ inch long, orange red or brown—439. *Drypetes lateriflora.*

429. Cotorro ***Adelia ricinella* L.**

Shrub or small tree mostly of dry areas, recognized by: (1) spiny whitish-gray twigs, conspicuous when leafless, with very short rounded side twigs; (2) leaves crowded and alternate, obovate to elliptic, ¾–1¼ inches long, ½–¾ inch wide, thin; (3) small greenish flowers male and female at leaf bases on different trees, male crowded and short-stalked, female 1–3 on long slender stalks; and (4) seed capsules 3-lobed, rounded, 5/16 inch in diameter.

Deciduous shrub or small tree to 30 feet high and 6 inches in trunk diameter. Bark light gray, smoothish to finely fissured, sometimes with spines persistent. The inner bark is fibrous, light gray, almost tasteless. Twigs are whitish gray, finely hairy when young, slender, often ending in sharp stout gray spines ½ inch or more in length.

Leaves are crowded on short side twigs and alternate, with short leafstalks 1/16 inch long. Blades with rounded apex and gradually narrowed base, not toothed on edges, with minute gland dots visible with a lens, the upper surface yellow green and slightly shiny or dull and hairless, the lower dull light green with minute tufts of hairs in vein angles.

Flowers male and female at leaf bases on different trees (dioecious), without petals. Male flowers crowded, about ⅛ inch wide, composed of whitish gray hairy 5-parted calyx and about 10–15 stamens. Female flowers 1–3 on slender stalks ½–2 inches long, consisting of 5 sepals and pistil with 3-celled ovary and 3 much divided styles. The brown seed capsules split into 3 parts and contain 3 round brown seeds ⅛ inch in diameter. Flowering mainly from fall to spring and fruiting from winter to summer.

The wood is light brown and hard.

Scattered and locally common in openings in dry and moist limestone forests and in dry coastal hills from sea level to 300 feet altitude, mostly in central and western Puerto Rico. Also Desecheo and through islands eastward, including Palominos, Vieques, Culebra, St. Croix and Buck Island, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guánica, Estate Thomas; Buck Island Reef, Virgin Islands, Sage Mountain.

RANGE.—Greater Antilles, Grand Cayman, Virgin Islands, St. Martin, Grenada, Tobago, and Curacao. Also Venezuela and Colombia.

OTHER COMMON NAMES.—espinillo, escambrón (Puerto Rico); jía, jía blanca, gavilán (Cuba); trejo (Dominican Republic); polegallo (Venezuela).

BOTANICAL SYNONYM.—*Ricinella ricinella* (L.) Britton.

29. Cotorro *Adelia ricinella* L.

Fruiting twig (left), leafy twig (upper right), twig with female flowers (lower right), natural size.

430. Nuez, candlenut ***Aleurites moluccana*** **(L.) Willd.***

Candlenut, the State tree of Hawaii, is an uncommon introduced tree. From a distance it is recognized by the whitish foliage. Further identification is by: (1) large leaves mostly palmately 3- or 5-lobed, with 5 or 7 main veins from base; (2) young leaves and twigs densely covered with tiny whitish or rusty-brown star-shaped and scaly hairs; (3) many white male and female flowers about 3/8 inch long in terminal clusters; and (4) rounded greenish to brown fruits 1½–2 inches in diameter, containing 1–2 large elliptic oily nutlike seeds.

Evergreen small to medium-sized tree, reaching 40 feet or more in height and 10 inches in trunk diameter, with irregular crown of spreading branches, and with milky juice. Bark gray, smoothish with many thin fissures. Inner bark with dark red outer layer and brown inside, tasteless. The stout twigs are greenish, covered with rusty-brown star-shaped hairs when young, becoming brown.

The stout petioles of the alternate leaves are 3–6 inches or more in length, often longer than blades, yellow green, hairy, with 2 dot glands at top above. The blades are mostly 4–8 inches long and broad, broadly ovate, with 3 or 5 long-pointed lobes, sometimes not lobed, the base nearly straight, thin, the upper surface green and becoming hairless, the lower surface light green, with star-shaped hairs along veins.

Flowers are male and female on the same tree (monoecious), white, in much forked hairy terminal clusters (panicled cymes) 3½–6 inches long and broad. Male flowers many, about 3/8 inch long, consisting of rounded hairy calyx 1/8 inch long, splitting into 2–3 lobes; corolla of 5 white petals 5/16 inch long; and 15–20 stamens. Female flowers few, composed of calyx, corolla, and pistil with hairy round 2-celled 2-ovuled ovary and 2 styles each 2-forked. The large fleshy fruits are borne singly on stout stalks and do not split open. Seeds 1–2, about 1 inch long, rough, hard like walnuts. Flowering and fruiting intermittently.

The wood is whitish and soft.

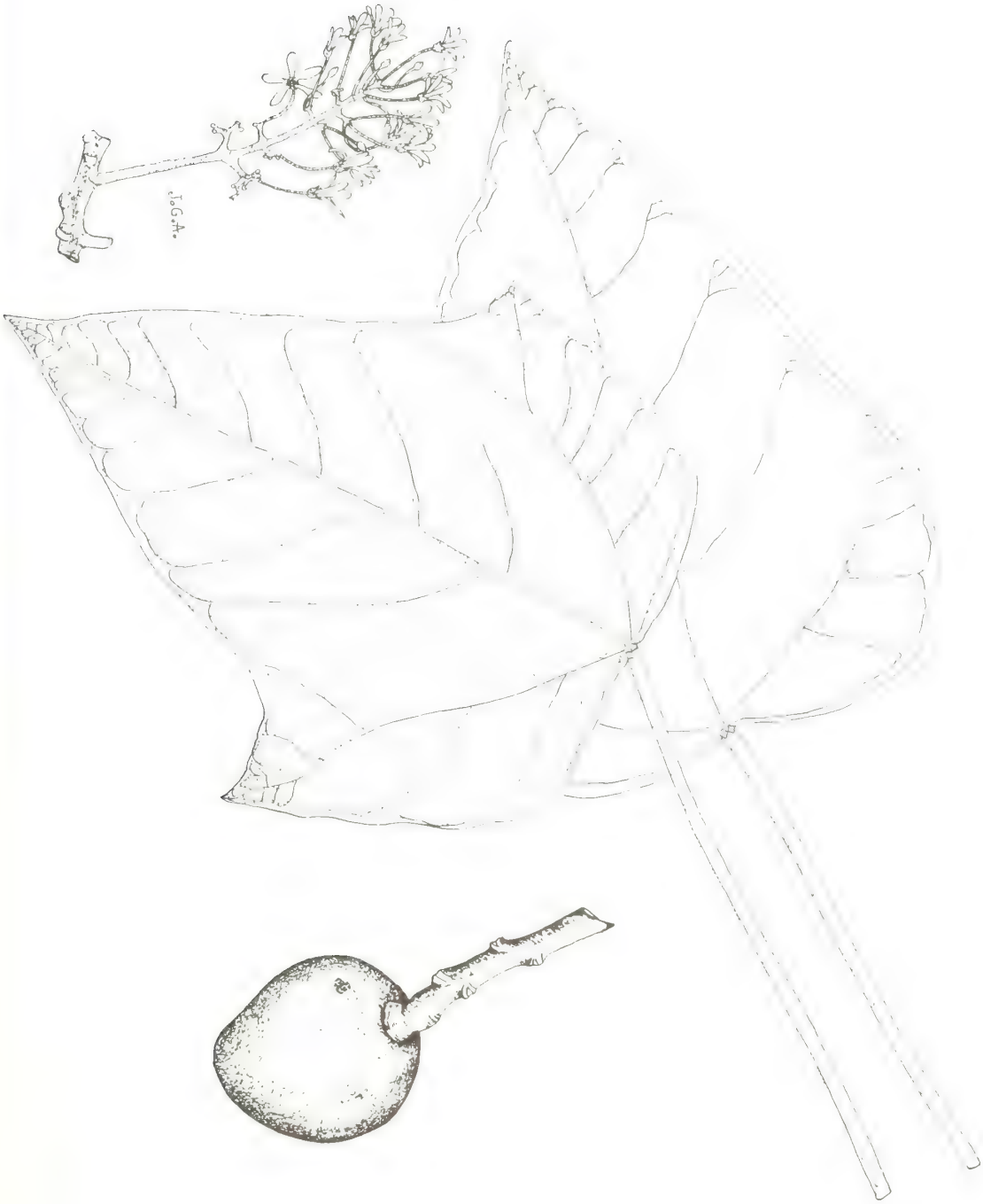
Elsewhere the seed oil has been produced comercially as a drying oil in paints and varnishes, also for candles, and has served in medicine. The English common name refers to the practice of stringing the seeds together for use as candles. It is reported that the seeds or nuts have been eaten when roasted. However, the raw seeds are poisonous and have medicinal properties.

Though uncommon, candlenut is planted occasionally in Puerto Rico as a roadside ornamental and shade tree and for the oil. It is found from sea level to 2,000 feet altitude, mainly in the moist limestone region. Britton and Wilson (*10*) recorded it also as sparingly spontaneous after cultivation in Puerto Rico, St. Croix, and St. Thomas.

RANGE.—Native probably of Malay region and named for the Molucca Islands, the original home uncertain. Widely spread by man over the Pacific Islands to Hawaii, where it is a characteristic tree. Introduced elsewhere through the tropics and becoming naturalized.

OTHER COMMON NAMES.—nuez, nogal, nuez de India, palo de nuez (Puerto Rico); candlenut, varnishtree (English, United States); avellano, nuez, jabilla extranjera (Dominican Republic); nogal de la India, nogal prieto (Cuba); árbol de Indias (El Salvador); nogal de la India (Venezuela); candlenut (Jamaica); noyer des Indes (Haiti); wild date, acrot, kemeri (St. Eustatius, Saba); nogueira, nogueira-de-Iguape, nox-da–India, nogueira-de-Bancul (Brazil).

Tung-oil tree or tungue *Aleurites fordii* Hemsl.,* of central Asia, is a related species commercially important for the similar oil extracted from the seeds. It differs in the ovate leaves heart-shaped at base and sometimes 3-lobed, the hairs not star-shaped, and larger handsome reddish-white flowers more than 1 inch wide. This species has been tested experimentally in Puerto Rico. It is grown in plantations along the Gulf Coast of southeastern United States from northern Florida to Texas and elsewhere for commercial production of the drying oil in the paint industry. The attractive seeds are poisonous and have caused death when eaten.



130. Nuez, candlenut *Aleurites moluccana* (L.) Willd.

Flowers (upper left), leaves, and fruit (below), two-thirds natural size.

431. ***Bernardia dichotoma*** **(Willd.) Muell. Arg.**

This shrub rarely is treelike with the height of a tree but with slender branches. Distinguishing characters are: (1) ovate, elliptic, or lanceolate soft-hairy thickened leaves 1¼–3½ inches long and ⅜–1¼ inches wide, narrowed to blunt apex, rounded with 2 glands at base, and with wavy teeth along edges; (2) minute greenish male flowers in scaly stalkless clusters ⅜–1¼ inches long at leaf bases, with 15–25 stamens; and (3) rounded 3-lobed hairy light green seed capsules more than ¼ inch long.

A deciduous shrub mostly 3–10 feet high rarely to 18 feet high and with trunk 2 inches in diameter. Elsewhere recorded as a tree to 25 feet. The bark is gray and smoothish, the inner bark orange. Twigs are gray, slender, and densely hairy.

The alternate leaves have paired bristlelike hairy scales (stipules) less than ⅛ inch long at base of the petioles of ¼–½ inch. The blades are covered with star-shaped hairs, the lower surface gray hairy with raised veins forming a network.

Male flowers are in scaly clusters (spikes) 3–5 together with green 3–5-parted calyx, no corolla, and 15–25 stamens. Female flowers on different plants (dioecious) are few or single, with 5- or 6-parted calyx and pistil with densely hairy 3-celled ovary and 3 short much-divided styles. The 3 seeds are egg-shaped, 3/16 inch long, mottled brown or black. Collected with flowers in spring and summer.

The wood is light brown and hard.

Uncommon in dry limestone forest of southern and southwestern Puerto Rico.

PUBLIC FOREST.—Guánica.

RANGE.—Bahamas, Greater Antilles, Grand Cayman, St. Vincent, and Grenadines.

OTHER COMMON NAME.—cacapul (Cuba).

BOTANICAL SYNONYM.—*Adelia bernardia* L.

31. *Bernardia dichotoma* (Willd.) Muell. Arg.

Fruiting twig (upper left), twig with female flowers (lower right), natural size.

432. ***Chamaesyce articulata* (Aubl.) Britton**

This shrub of dry coastal forests becomes a small tree on Desecheo Island and in southeastern Puerto Rico. It is recognized by: (1) abundant whitish latex; (2) the twigs with enlarged ringed nodes, branches widely forking; (3) paired, small leaves, mostly very narrow, $\frac{3}{8}$–2 inches long and $\frac{1}{8}$–$\frac{3}{16}$ inch broad; and (4) 3-angled rounded seed capsules $\frac{1}{8}$ inch long.

Deciduous shrub 5 feet high, rarely becoming a small tree 15 feet high and 3 inches in trunk diameter, with slender widely spreading branches and sparse foliage. The bark is gray and smoothish, with rings or joints from nodes 1–1$\frac{1}{2}$ inches apart. Inner bark is light green at the surface and light brown within, slightly bitter, yielding abundant latex when cut. Twigs are slender with enlarged nodes, greenish, hairless or minutely hairy, becoming brown.

Leaves are opposite, hairless or nearly so. Petioles $\frac{1}{16}$ inch long, slender, joined by a hairy-margined sheath (stipules), which forms a ring. Blades linear or narrowly oblong, the base short-pointed and slightly unequal, apex short-pointed, and border slightly curved under, the upper surface dull green, and lower surface whitish green. Sometimes the leaves are very narrow, to 2$\frac{1}{2}$ inches in length and less than $\frac{1}{8}$ inch wide. A form on Desecheo has short wide oblong leaves to 1 inch long and $\frac{1}{2}$ inch broad.

A greenish cup (involucre) $\frac{1}{8}$ inch long, with 4 yellowish petallike glands on a short stalk at or near the end of a twig bears many male flowers and 1 female flower (monoecious). Each male flower consists of a yellow stamen about $\frac{1}{16}$ inch long. The female flower has a long-stalked green pistil more than $\frac{1}{8}$ inch long with 3-angled 3-celled ovary and slender 3-forked style. The 3-angled rounded hairless capsule $\frac{1}{8}$ inch long splits into 3 parts, each containing 1 pinkish gray seed $\frac{1}{16}$ inch long. Flowering and fruiting through the year.

The sapwood is light brown and slightly soft.

Uncommon locally in dry coastal forest from sea level to 400 feet altitude in rocky and sandy soils of Puerto Rico, in the southeastern part with black mangrove sometimes reaching tree size. Also in Desecheo and Muertos and through the islands eastward from Icacos to Culebra, and Vieques. Through the Virgin Islands, including St. Croix, St. Thomas, St. John, Tortola, Virgin Gorda, and Anegada.

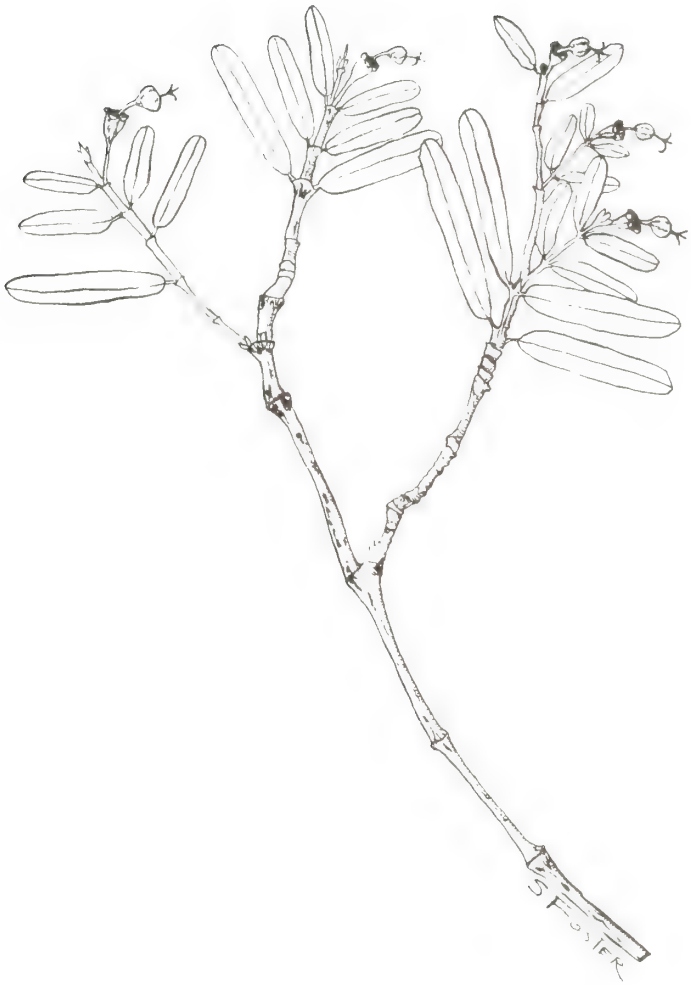
PUBLIC FOREST AND PARKS.—Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Bahamas (East Caicos), Puerto Rico and Virgin Islands, and Lesser Antilles from St. Martin, Saba, and Barbuda to St. Vincent and The Grenadines.

OTHER COMMON NAMES.—bois lait (Guadeloupe); bushy spurge (Bahamas).

BOTANICAL SYNONYM.—*Euphorbia articulata* Aubl.

This species is the only native member of its genus attaining tree size. The others, about 16 species, include annual and perennial herbs and a few low shrubs. The specific name refers to the jointed stems with enlarged nodes.



32. *Chamaesyce articulata* (Aubl.) Britton

Natural size.

433. Papayuelo ***Cnidoscolus aconitifolius*** **(Mill.) I. M. Johnst.***

This ornamental small tree sometimes regarded as a tree spinach is recognized by: (1) very stout green twigs yielding abundant white latex when cut; (2) stinging hairs sometimes scattered along twigs and flower stalks or absent; (3) large leaves with long petioles and palmately 7- or 5-lobed, deeply divided blades 6–14 inches long and broad; and (4) many fragrant small white male and female flowers in flat-topped long-stalked, erect terminal clusters.

An evergreen planted tree 20 feet high, with short stout trunk to 6 inches in diameter, few stout branches, and compact dense half-round crown as broad as height of tree. Bark light gray brown with darker streaks, becoming finely fissured. Inner bark whitish with light green outer layer, almost tasteless, with abundant white latex. Twigs very stout, green with large whitish dots (lenticels), becoming light gray brown, with large oblong raised leaf scars and often with scattered stinging hairs.

Leaves alternate, with very long round green petioles 6–14 inches long, spreading in all directions. Leaf blades 6–14 inches long and broad, palmately 7- or 5-lobed with as many light green veins from the heart-shaped base, the lobes deeply divided and narrow, long pointed, and coarsely toothed with smaller lobes, thin and hairless. The upper surface is dull dark green and turned up at veins, the lower surface dull light green with raised veins.

Flower clusters (cymes) are terminal at the end of a long stalk, flat-topped, and 3–5 inches across, bearing many male flowers and few female flowers (monoecious) without petals. Male flowers many but only a few open at one time, about ½ inch long and broad, consisting of narrow greenish-tinged calyx tube ¼ inch long, 5 spreading elliptic lobes ¼ inch long, and on orange disk the white stamen column with 2 circles of 5 stamens to ⅜ inch long and third circle nonfunctional (staminodes). Female flowers few, terminal, opening first, composed of 5 white sepals more than ¼ inch long which fall early and on a disk the pistil ¼ inch long, with finely hairy light green egg-shaped 3-celled ovary with 3 ovules and 3 white widely working styles. The fruit is a bristly elliptic 3-celled capsule ⅜ inch long. Seeds 1 in each cell, more than ¼ inch long. Flowering through the year but not bearing fruits in Puerto Rico.

Wood light brown, soft.

Planted as an ornamental and shade tree along city streets, for example in Ponce, and near houses in moist parts of Puerto Rico, locally common. A relatively recent introduction and not mentioned by Britton and Wilson (*10*). Attractive in gardens but less suited to roadsides, because the branches break easily. Propagated from seeds and cuttings and short-lived.

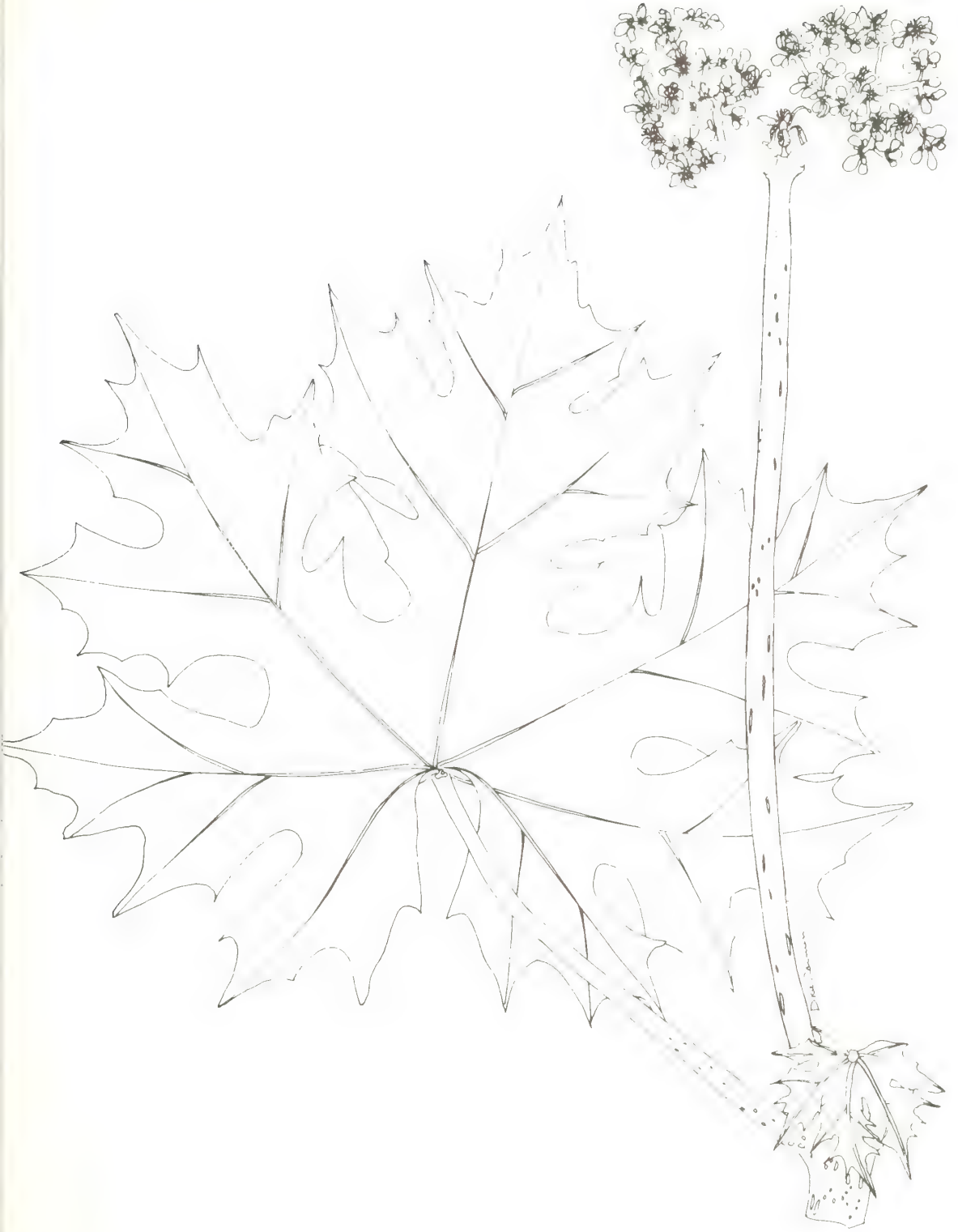
Elsewhere, the plants with stinging hairs are grown as effective hedges and for living fence posts. However, some cultivated plants are hairless. Young shoots and leaves are cooked and eaten as a vegetable like spinach. The leaves have been applied also as poultices in home remedies. The latex of related species has been investigated as a possible source of rubber.

RANGE.—Native in southern Mexico and perhaps northern Central America to Guatemala and Honduras, the range extended by cultivation southward to Venezuela and Peru.

OTHER COMMON NAMES.—papaya macho (Puerto Rico); chay, picar, mala mujer (Mexico); chichicaste (Guatemala, Honduras); chaya, copapayo (Guatemala); chaidra, chaira, chayo, copapayo, papayilla (El Salvador); quelite (Nicaragua); chicasquil (Costa Rica); coquillo (Panama); papayuelo, panamá, manolo (Colombia).

BOTANICAL SYNONYM.—*Jatropha aconitifolia* Mill.

The common name papayuelo indicates the similarity of the leaves to those of the unrelated fruit, No. 174, lechosa, papaya, *Carica papaya* L.*



3. Papayuelo *Cnidoscolus aconitifolius* (Mill.) I. M. Johnst.*

Flowering twig, two-thirds natural size.

434. Marán ***Croton astroites*** **Dryand.**

A shrub, rarely small tree, common in dry areas, mostly in Virgin Islands, distinguished by: (1) leaves and flowers densely covered with whitish star-shaped hairs; (2) petioles and young twigs with orange or rusty-colored hairs; (3) ovate leaves 1¼–3 inches long and ⅜–1¼ inches wide, with 5 or 7 veins from base; (4) minute greenish flowers in narrow erect clusters, the female at base and male above (monoecious); and (5) elliptic, slightly 3-lobed, densely hairy seed capsules more than ¼ inch long.

Evergreen shrub or rarely a tree to 15–20 feet high and 3 inches in trunk diameter. The bark is gray and smooth.

The petioles of the alternate leaves are ¼–1 inch long, with orange or rusty-colored hairs. Leaf blades are short- to long-pointed at apex, rounded or slightly notched at base, sometimes with small teeth on edges, densely covered with whitish star-shaped hairs, paler beneath.

Flower clusters (racemes) 1–2 inches long bear many nearly stalkless male flowers ⅛ inch long with 5-lobed hairy calyx and about 16 stamens. Female flowers few at base of same clusters, about ⅛ inch long, with 5-lobed calyx, 3-celled densely hairy ovary and 3 threadlike styles, each divided. The seed capsules have at the base the enlarged calyx to 5/16 inch long and split into 6 parts. Flowering and fruiting through the year.

Common and forming thickets in dry areas near sea level and at low altitudes, particularly in heavily grazed areas. These unpalatable plants increase in numbers after other species are eliminated by severe grazing. Local in Puerto Rico, collected at Cabeza de San Juan and Aguadilla. Also Culebra, Vieques, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

The young twigs and sap formerly were used elsewhere in home remedies.

PUBLIC PARKS.—Buck Island Reef, Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands, and Lesser Antilles from St. Martin, St. Barts, and St. Eustatius to Guadeloupe.

OTHER COMMON NAMES.—maná (Puerto Rico); balsam (Barbuda, St. Barts); ti-baume (Guadeloupe); wild marrow (St. Martin, St. Eustatius).

34. Marán *Croton astroites* Dryand.

Twig with flowers and fruits (above), twig with male and female flowers (below), natural size.

435. Adormidera ***Croton rigidus*** **(Muell. Arg.) Britton**

This shrub widespread in dry areas rarely becomes treelike. Identified by: (1) orange bitter sap; (2) the pungent odor of crushed leaves; (3) twigs, leaves, and flowers densely covered with whitish or gray star-shaped hairs; (4) elliptic to lanceolate or ovate leaves mostly 1–2 inches long and ⅜–¾ inch wide, sometimes larger, with paired dotlike glands at base beneath; (5) minute greenish flowers in narrow erect clusters, the female at base and male above (monoecious); and (6) rounded, slightly 3-lobed, densely hairy brown seed capsules about 3/16 inch in diameter.

An evergreen shrub or rarely treelike and 15 feet high and 2 inches in trunk diameter or larger. The bark is light gray, smooth or slightly fissured, with orange bitter sap. Inner bark is light brown and slightly bitter.

The alternate leaves have petioles ⅛–½ inch long. The blades are blunt to long-pointed at apex, rounded at base, not toothed on edges, densely covered with whitish or gray star-shaped hairs on both surfaces, paler beneath.

The flower clusters (racemes) 1–2 inches long bear many nearly stalkless male flowers ⅛ inch long with 5-lobed hairy calyx and 12–16 stamens. The few female flowers at base of some clusters are slightly larger, with 3-celled hairy ovary and 3 threadlike styles, each divided. Seeds 3, gray, less than ⅛ inch long. Flowering and fruiting nearly through the year.

The wood is hard and whitish.

Abundant and forming thickets in dry areas, near sea level and at low altitudes, especially where heavily grazed by goats and other animals. These unpalatable plants spread and become dominant after other species are eliminated by severe grazing. Puerto Rico, Culebra, Culebrita, Vieques, St. Croix and Buck Island, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Guánica, Susúa, Estate Thomas; Buck Island Reef, Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands only.

OTHER COMMON NAMES.—guayacanillo (Puerto Rico); yellow balsam, sage, soldier whip (Virgin Islands).

Several races differ in shape and size of leaves, hairiness, and color of twigs.

35. Adormidera *Croton rigidus* (Muell. Arg.) Britton

Fruiting twig (upper left), flowering twig (below), natural size.

436. Ditta — *Ditta myricoides* Griseb.

Ditta, a resinous small tree or shrub of the eastern mountains, is recognized by: (1) reverse lance-shaped (oblanceolate) leaves 1¾–3½ inches long and ⅜–1 inch broad, widest beyond middle, short-pointed at apex and long-pointed and tapering toward the short leafstalk, slightly thickened, the edges minutely toothed and turned under; (2) flowers male and female, minute and inconspicuous, less than ⅛ inch long, stalkless at base of leaves; and (3) seed capsules nearly round, about ¼ inch long.

A small evergreen resinous tree or shrub to 35 feet high and 6 inches in trunk diameter, hairless throughout. The bark is slightly fissured, very light brown, sometimes covered with mosses. Inner bark is almost tasteless. The twigs are light brown.

The alternate leaves have short leafstalks ⅛–¼ inch long, prominent raised veins on both sides, are shiny green to dark green on upper surface and slightly paler beneath. A resinous exudate is produced at leaf bases.

Male flowers are borne several in a cluster at the base of a leaf. They are about 1/16 inch long and broad, yellowish, each consisting of 3 broad sepals and several almost stalkless stamens. Female flowers on different plants (dioecious) are borne 1 or 2 together, stalkless, less than ⅛ inch long, consisting of 2–3 broad sepals, a round green 2-celled ovary with 2 ovules and 2 deeply 2-forked brown stigmas. The seed capsules are nearly round, about ¼ inch long, and contain 1 or 2 light brown elliptic seeds 3/16 inch long, covered with minute tubercles. Found in flower from May to September and in fruit from August to November.

The sapwood is light brown, hard, moderately heavy, and fine-textured.

Uncommon in upper Luquillo and upper Cordillera forests and dwarf forest at 2,000–2,500 feet altitude in eastern and central mountains of Puerto Rico. Local in Luquillo Mountains, Sierra de Cayey, and Toro Negro Forest, and not found in Puerto Rico until 1914. This is the only species of its genus.

PUBLIC FORESTS.—Carite, Luquillo, Toro Negro.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAME.—jaboncillo (Puerto Rico).

36. Ditta *Ditta myricoides* Griseb.

Natural size.

437. Hueso ***Drypetes alba* Poit.**

This small tree is characterized by: (1) ovate to lance-shaped leaves 2–5 inches long and ¾–4½ inches wide, long-pointed at apex, short-pointed and unequal or oblique at base, and inconspicuously wavy-toothed on margin, the teeth sometimes sharp; (2) small yellow-green flowers clustered at leaf bases, male and female on different trees (dioecious); and (3) whitish elliptic fruits more than ⅜ inch long, slightly oblique and curved, 2–7 on short stalks at leaf bases.

Evergreen small tree to 35 feet high and 6 inches in trunk diameter. The bark is gray, smoothish with small warts (lenticels). Inner bark is light brown, gritty and slightly bitter. The twigs are gray to brown, slender, and hairless.

The leaves are alternate in 2 rows, hairless, with slender petioles ¼–⅜ inch long. Blades are unequal or oblique at base, slightly thickened and leathery, the side veins inconspicuous, the upper surface green and shiny, the lower surface pale green.

Male flowers on stalks more than ⅛ inch long are numerous, about ⅛ inch long, consisting of 4–6 sepals less than 1/16 inch long and 4–6 somewhat longer stamens opposite them and around a disk. Female flowers have similar sepals and pistil with hairy egg-shaped 1-celled, 2-ovuled ovary and 1 style. The fruits (drupes) are clustered on stalks 3/16 inch long, egg-shaped and slightly oblique and curved, with sepals at base and style remaining near end, the surface minutely hairy. Within the stone is 1 seed. With flowers and fruits in spring and summer.

The wood is light brown and hard.

Uncommon in moist limestone and lower Cordillera forests at 200–2,500 feet altitude mostly in western Puerto Rico, also northeastern.

PUBLIC FORESTS.—Cambalache, Guajataca, Maricao, Río Abajo, Susúa, Vega.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, Antigua, and Guadeloupe.

OTHER COMMON NAMES.—cafeíllo, palo de vaca, palo de vaca blanco (Puerto Rico); lirio, palo blanco, azota criollo (Dominican Republic); hueso, maco, cuero duro (Cuba); bois côtelette, laboue cochon (Haiti); café-marron (Guadeloupe).

437. Hueso *Drypetes alba* Poit.

Flowering twig (above), fruiting twig (below), natural size.

438. Encinillo ***Drypetes ilicifolia*** **Krug & Urban**

This distinctive shrub or small tree of limestone hills and sand dunes of northern and western Puerto Rico is easily recognized by its hollylike, spiny-margined leaves. Its characters for identification are: (1) oblong or elliptic leaves, stiff, thick, and leathery, with few sharp spiny yellowish teeth along wavy edges; (2) small yellow-green flowers, male and female, clustered at leaf bases; and (3) elliptic fruits nearly ¾ inch long, slightly oblique.

Evergreen shrub or small tree to 40 feet high and 8 inches in trunk diameter. The light gray bark is rough and fissured, the inner bark light brown and tasteless. Twigs are whitish gray, finely warty (lenticels), hairless, often angled when young.

The leaves are alternate in 2 rows, hairless, with petioles less than ¼ inch long. The blades are 2–6 inches long and 1–2 inches wide, the short-pointed apex ending in a spine nearly ⅛ inch long, and the base rounded or notched and slightly unequal or oblique, slightly concave and bent up from midrib. The upper surface is green and the lower surface yellow green, both with a prominent network of raised veins.

The flowers are male and female on different trees (dioecious), the female apparently not yet described. Male flowers clustered at leaf bases on stalks more than 1/16 inch long have 4–5 sepals nearly ⅛ inch long, greenish and finely hairy, and 4–5 opposite stamens less than ⅛ inch long. The fruits (drupes) with 5 minute hairy sepals at base are finely hairy, have 1 stigma, and are thick-walled, 1-celled, and 1-seeded. With flowers in spring and summer and with fruits in summer.

The wood is light brown and hard.

Uncommon in moist limestone forest and recorded from sand dunes, 200–500 feet altitude, in northern and western Puerto Rico. Found near Loiza, Bayamón, Arecibo, and Quebradillas.

PUBLIC FORESTS.—Cambalache, Guajataca, Vega.

RANGE.—Puerto Rico and Peninsula of Samaná, Dominican Republic, southeastern Hispaniola. Also rare and local in Jamaica.

OTHER COMMON NAME.—rosewood (Jamaica).

438. Encinillo *Drypetes ilicifolia* Krug & Urban

Twig with male flowers (left), twig with female flowers and fruits (right), natural size.

439. Cueriduro, Guiana-plum *Drypetes lateriflora* (Sw.) Krug & Urban

This small tree rare in moist limestone forest is identified by: (1) oblong or elliptic leaves 2–4½ inches long and ¾–1¾ inches wide, long-pointed at apex and short-pointed and slightly unequal at base, with margin straight or slightly wavy, in 2 rows on slender twigs; (2) many small greenish white flowers clustered at leaf bases, male and female on different trees (dioecious); and (3) orange-red or brown egg-shaped fleshy fruits ½–⅝ inch long with large stone.

Evergreen small tree 30 feet high and 5 inches in trunk diameter. Bark light gray, smoothish to finely fissured, the inner bark light brown and slightly bitter. Twigs are gray, slender, and hairless.

The leaves are alternate in 2 rows, hairless, with slender petioles ¼–⅜ inch long. Blades are often unequal at base, slightly thickened and leathery, the margin straight or minutely wavy, not toothed (spiny toothed on shoots from cut stumps), both surfaces green to dark green and slightly shiny with veins raised.

The flowers are clustered at leaf bases on stalks about ⅛ inch long. Male flowers about ⅛ inch long have 4–5 pointed greenish-white sepals nearly ⅛ inch long, hairy on edges and 3–5 stamens longer than sepals and opposite them and around a disk. Female flowers have similar sepals and in a saucer-shaped disk the pistil with hairy 2-celled ovary with 2 ovules in each cell and 2 styles. The fruits (drupes) borne singly at leaf bases are finely hairy and have remains of sepals at base and 2 styles at apex. The orange-red bitter pulp encloses the stone and 1 elliptic brown seed about ¼ inch long. Flowering in spring and summer and with fruits in summer.

The wood is described as dark brown with thick light brown or yellowish sapwood, heavy, hard, brittle, and fine-textured.

Rare in moist limestone forest at 200–400 feet altitude in northern and western Puerto Rico. Not on nearby islands.

PUBLIC FORESTS.—Cambalache, Guajataca, Río Abajo, Susúa, Vega.

RANGE.—Southern Florida including Florida Keys, Bahamas, Cuba, Jamaica, Hispaniola, and Puerto Rico. Also southern Mexico, British Honduras, Guatemala, and El Salvador.

OTHER COMMON NAMES.—ciruela de Guayana (Puerto Rico); pae manuel (Dominican Republic); hueso, hueso de monte, hueso blanco, ramón blanco, cueriduro (Cuba); mula (El Salvador); white-wood, Guiana-plum (Jamaica); Guiana-plum (Bahamas); Guiana-plum, white-wood drypetes (United States); bois côtelette (Haiti).

439. Cueriduro, Guiana-plum *Drypetes lateriflora* (Sw.) Krug & Urban

Flowering twig (lower left), fruiting twig (right), natural size.

440. Carrasco, poison spurge ***Euphorbia cotinifolia* L.***

Carrasco or poison spurge is a very poisonous uncommon ornamental shrub or small tree. It is characterized by: (1) abundant poisonous white latex or milky sap, caustic and irritating to the skin; (2) broadly ovate to nearly round leaves mostly 2–3 inches long and 1½–2½ inches wide, sometimes larger, green to coppery purple, mostly 3 at a node on very slender petioles often longer than blades; (3) inconspicuous minute male and female flowers borne in small greenish cups 3/16 inch across the whitish borders in terminal crowded clusters; and (4) small 3-angled capsules 3/16 inch across the whitish borders in terminal crowded clusters; and (4) small 3-angled capsules 3/16 inch in diameter.

A deciduous planted shrub or rarely small tree to 15 feet high. Bark whitish and smoothish. Poisonous white latex flows profusely from cuts on twigs and bark. The twigs are hairless or nearly so and have 2 dot glands between each 2 leaves.

Leaves mostly in 3's (whorled). Blades are rounded at both ends or notched at base, not toothed on edges, thin, beneath paler and sometimes slightly hairy.

Flower clusters (cymes in panicles) are terminal, much branched, and showy. The cups contain minute male and female flowers (monoecious). The seed capsules are hairy when young and contain 3 seeds.

Introduced in Puerto Rico as an ornamental for the reddish foliage but not common. Further planting of this dangerous shrub is not recommended. Elsewhere, notably in Central America, the plants are grown in hedges, borders, and as living fence posts, propagated from cuttings.

The milky sap produces a rash in contact with the skin of many persons (like poison-ivy) and when taken internally causes violent vomiting and may be fatal. Indians of continental America used the sap as a poison on arrows and for catching fish. The seeds reportedly have strong laxative properties.

RANGE.—Native from southern Mexico to Guianas, Brazil, and Peru, spread by cultivation, and also introduced in West Indies.

OTHER COMMON NAMES.—yerba lechera, hierba mala (Cuba); mala mujer, trompillo, piñoncillo, mata gallina (Mexico); hierba mala (Guatemala); sapo (Nicaragua); barrabás (Costa Rica); manzanillo, lechero, lechero de lindero, nacedero, lorencillo (Colombia); lechera (Venezuela); yuquilla (Peru); poison spurge (English); manzaliña bobo, manzanilla bobo (Dutch Antilles).

BOTANICAL SYNONYMS.—*Euphorbia cotinoides* Miq., *Aklema cotinoides* (Miq.) Millsp., *A. cotinifolia* (L.) Millsp.

440. Carrasco, poison spurge *Euphorbia cotinifolia* L.*

One-half natural size.

441. Candelero, mottled spurge ***Euphorbia lactea* Haw.***

This cactuslike shrub or small tree planted for ornament and in hedges is easily identified as a spurge by the abundant white poisonous latex that flows from cuts. Other distinguishing characters are: (1) fleshy or succulent green stems and branches 3-angled and 1–3 inches across; and (2) leaves minute and shedding early, represented by paired gray spines (stipules) ¼–⅛ inch long from raised edges or ridges of branches.

A usually leafless but evergreen shrub or small tree to 25 feet high and 6 inches in trunk diameter, with fleshy or succulent stems, much branched, hairless throughout. Stems with whorls of branches nearly to base but on large plants shedding the spiny tissue and developing a rounded brown, fissured trunk. The 3-angled (sometimes 4-angled) branches are mostly joints 4–12 inches long and 1–3 inches across, slightly shiny dark green, with yellowish or whitish streak in the groove of the axis between the angles. White latex runs abundantly from the outer part of cut stems. The soft cut branches have a light green outer layer less than ⅛ inch thick, which yields latex, and within whitish watery tissue, slightly bitter.

Raised leaf bases ¼–½ inch high and about ¾–1 inch apart along the edges of branches correspond to nodes and bear paired spreading gray spines (stipules). The few scattered leaves are alternate, minute, stalkless, rounded, ⅛–¼ inch long, slightly shiny green, succulent, slightly thick and shedding early, or absent.

The flowers are small and inconspicuous, borne intermittently.

Wood of trunks is whitish and very soft.

The latex or milky juice is bitter, poisonous, and caustic. It should not come in contact with sores, eyes, mouth, or mucous membranes. Reportedly it injures the eyes and can cause blindness.

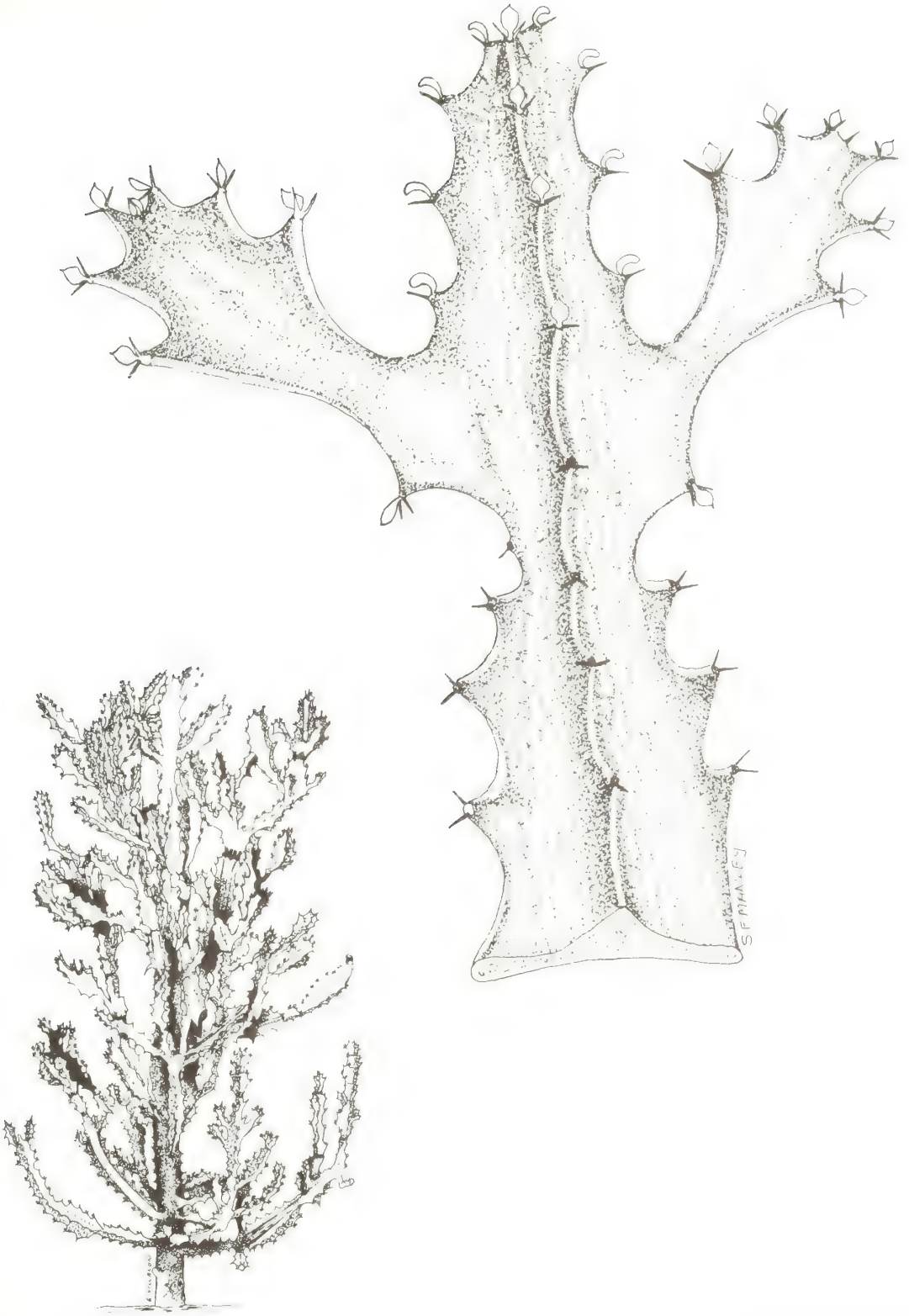
These plants with succulent stems and water storage tissue are adopted to dry regions. Like cacti, they have developed similar compact form with reduced surface and less water loss, also green stems replacing leaves in food manufacture.

Plants are grown for ornament, in fences, and trimmed as hedges in Puerto Rico and the Virgin Islands, uncommon and sometimes persisting afterwards. Also southern Florida and elsewhere in tropical regions. Escaping from cultivation, spreading and forming thickets in some places. Recommended for hedges in sand dunes along ocean fronts. Propagated easily by cuttings.

PUBLIC FOREST.—Guánica.

RANGE.—Native of East Indies.

OTHER COMMON NAMES.—escambrón, moteado (Puerto Rico); candelero, cacto, raqueta (Dominican Republic); cardón, tuna de cruz (Cuba); lechero de lindero (Colombia); candélabre (Haiti); cactus Surinam, corona di sumpiña (Dutch Antilles); mottled spurge, milkstripe euphorbia (United States); monkeypuzzle euphorbia, Malayan spurge-tree (Virgin Islands).



441. Candelero, mottled spurge *Euphorbia lactea* Haw.*

Leafy twig (above), natural size; plant at lower left.

442. Hedge euphorbia ***Euphorbia neriifolia* L.***

This ornamental spurge with fleshy leaves and stems yields white poisonous latex abundantly from cuts. Other characters for identification are: (1) stout dull green branches ¾–1 inch in diameter, bluntly 5-angled; (2) thick stiff leaves narrowly obovate or oblong, 3–5 inches long, sometimes larger; and (3) paired gray spines (stipules) 1/16–⅛ inch long at leaf base and persistent on stem.

Evergreen or deciduous shrub or small tree 25 feet high and 6 inches in trunk diameter or larger, with relatively few stout fleshy or succulent branches, hairless throughout. Trunks becoming round, light brown, smoothish, slightly fissured, with scattered spines persistent. The stout dull green branches or twigs are soft and consist of a thin light green outer layer about 1/16 inch thick and beneath whitish watery tissue, slightly bitter. Twigs end in a rounded or blunt tip with young pointed leaves.

The alternate leaves spread at right angles to the twig and are scattered in 5 vertical rows along the trunk. They are commonly 3–5 inches long and 1–2 inches wide, sometimes larger, tapering to a short stout petiole and widest near the blunt apex, with short point, thick, fleshy, and stiff, curved up from center to edges, without visible veins, shiny green above the dull green beneath. At the base are 2 gray spines (stipules). Upon shedding, a rounded light brown leaf scar ¼ inch across remains with the paired spines at the slightly raised base.

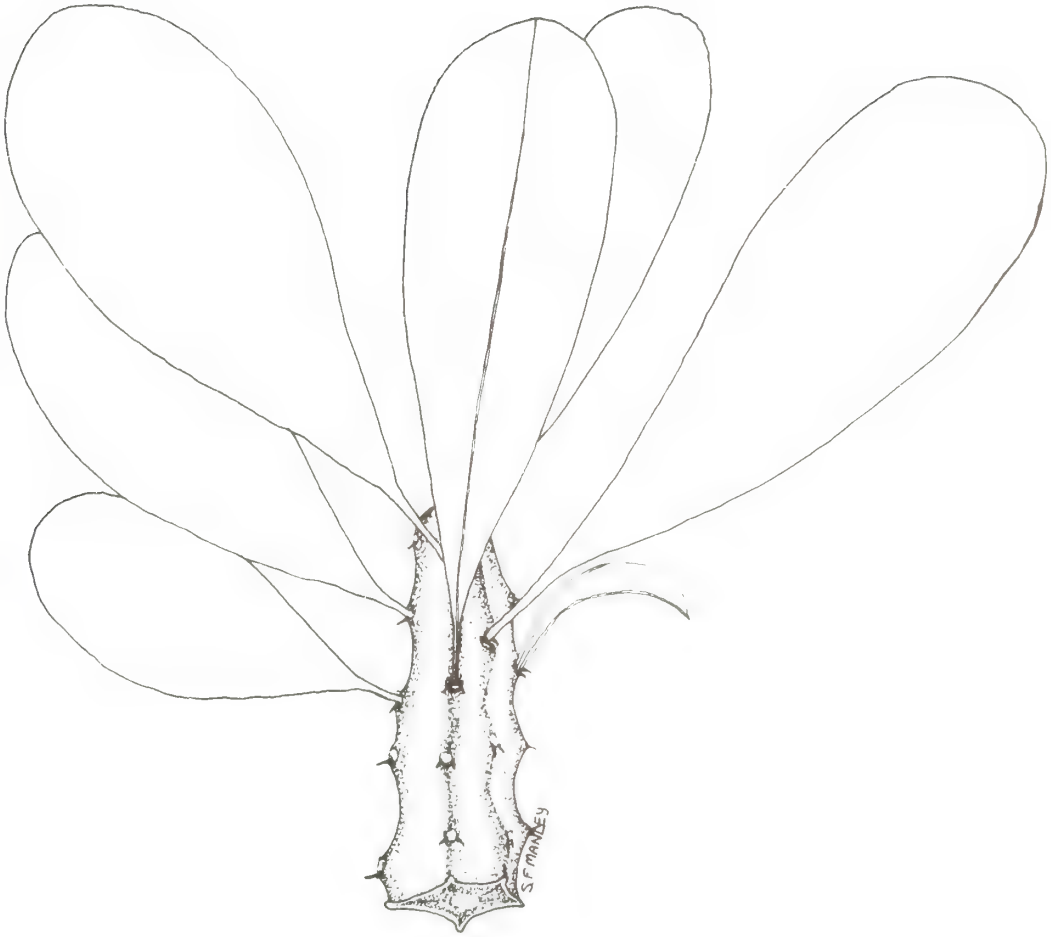
A few flower clusters (cymes) ½–1 inch long with stout forking branches are borne near ends of ridges or at bases of upper leaves. Flowerlike heads (involucres) few on short stout stalks, greenish, fragrant, cuplike, about ⅜ inch across, bordered by 5 short petallike greenish lobes each with gland at base, containing 1 female flower and many male flowers (monoecious). The female flower, which opens first, about ⅛ inch long is a pistil with 3-angled 3-celled ovary with 3 ovules and 3-forked style. Many male flowers borne a few at a time consist of 1 dark red stamen about ⅛ inch long, in mass of greenish hairlike scales. Flowering intermittently.

The latex or milky juice is bitter, poisonous, and caustic.

Planted for ornament and in hedges in Puerto Rico and St. Thomas and perhaps others of the Virgin Islands and elsewhere through the tropics. Cristate forms with enlarged or crested branches are in cultivation.

RANGE.—Native of East Indies.

OTHER COMMON NAMES.—hedge euphorbia (English); tuna francesa (El Salvador); lechero de lindero, lechero de cercas, nacedero (Colombia); adorna patio (Dominican Republic); cordón santu (Dutch Antilles).



442. Hedge euphorbia *Euphorbia neriifolia* L.*

Leafy twig (above), fruit and male and female flowers (below), natural size.

443. Esqueleto, pencilbush, milkbush ***Euphorbia tirucalli* L.***

This ornamental succulent shrub or small tree has abundant white poisonous latex as in other spurges and differs also from cacti in absence of spines. It is recognized by: (1) many cylindric pencillike fleshy twigs or joints, forking upward; and (2) narrow green leaves ½–1 inch long, shedding early and usually absent.

Shrub or small tree becoming 30 feet high and 6 inches in trunk diameter, with evergreen fleshy or succulent branches but usually leafless, hairless throughout. Bark dark green, smooth or rough. Branches many, whorled or sometimes single, curving outward and erect to form an irregular brushlike crown. The pencillike dull green twigs or joints commonly 3–5 inches long and ¼ inch in diameter, or only ⅛ inch at the rounded end and becoming ½ inch. The smooth hairless surface often has many fine whitish lines. White latex, caustic and poisonous, flows from cut surfaces. Under the surface the twigs are light green, with sour taste.

Leaves few, scattered, alternate, oblanceolate, ½–1 inch long, ⅛ inch wide, broadest beyond middle, short-pointed at apex and tapering to stalkless base, slightly thick and succulent, the upper surface dull green, the lower surface paler with faint midvein.

Flower clusters are yellowish heads or balls ½–¾ inch across, stalkless at ends of twigs, composed of many crowded cuplike clusters (involucres) ⅛–3/16 inch across. Within are many male flowers each of 1 stamen on a stalk. Flowering intermittently.

Wood whitish, soft.

Planted for ornament in Puerto Rico and Virgin Islands but uncommon. Elsewhere also a hedge plant. Propagated by cuttings. In southern Florida recommended for dune planting. Northward in continental United States grown as a potted plant. The milky sap causes a rash on the skin of some persons and is poisonous if taken internally.

RANGE.—Native of Africa. Planted through the tropics including Florida and Hawaii.

OTHER COMMON NAMES.—antena, palito, esquelito, alfabeto chino (Dominican Republic); milkbush, pencil-tree, Indian tree spurge (English); potlood plant coral-cactus, wishbone-cactus (Dutch Antilles); aveloz (Brazil).

443. Esqueleto, pencilbush, milkbush *Euphorbia tirucalli* L.

Leafy twig, natural size.

444. Tártago, physic-nut ***Jatropha curcas* L.***

Tártago or physic-nut is a small ornamental tree escaping from cultivation, identified by: (1) the latex between water and milk in color that runs from cuts; (2) broadly ovate or heart-shaped leaves mostly slightly 3- or 5-lobed or angled, with 5 or 7 main veins from base, 3–5½ inches long and nearly as wide, the petioles mostly longer than blades, crowded at ends of stout twigs; (3) yellow-green bell-shaped flowers ¼ inch long and broad, several on short stalks at leaf bases; and (4) elliptic dark brown capsules 1–1½ inches long and ⅞ inch across, splitting into 3 parts, with 3 poisonous seeds.

Deciduous small tree or shrub 10–15 feet high and to 6 inches in trunk diameter, with rounded thin crown of few spreading branches. Bark light brown, smoothish and slightly warty, the inner bark brown and slightly bitter. Twigs are stout, ¼–½ inch in diameter, light green but becoming gray, smooth with whitish dots (lenticels) and raised half-round leaf scars, hairless, with chambered pith.

Leaves alternate but mostly crowded at ends of twigs. Petioles light green, round, 2½–5½ inches long. Blades are broadly ovate, deeply notched or heart-shaped at base, short-pointed at apex, and with 2–4 blunt lobes on sides, thin, hairless or nearly so. The upper surface is dull green with veins yellowish and slightly sunken, the lower surface dull light green with raised veins.

Flowers several to many in greenish branched clusters (cymes) 1–3 inches long at leaf bases, fragrant, on stalks about ¼ inch long, male and female on the same plant (monoecious). The calyx consists of 5 sepals nearly ⅛ inch long; corolla yellow green, bell-shaped, ¼ inch long, divided to middle into 5 spreading narrow lobes, hairy within, and there are 5 minute glands at base. Male flowers many, with 10 stamens, 5 united at base and 5 united in a column. Female flowers borne singly have pistil with elliptic 3-celled 3-ovuled ovary, short style, and 3 spreading 2-forked stigmas. The capsules with enlarged sepals at base are slightly fleshy but become dry and split into 3 parts. There are 3, sometimes 2, oblong blackish seeds about ⅝ inch long, similar to those of castorbean. Flowering irregularly through the year.

The wood is white and very soft and spongy.

Seeds, leaves, and sap have been employed widely in home remedies. The pleasantly flavored oily seeds are a drastic purgative but poisonous and dangerous and have caused death when eaten by small children. It is reported that the seeds are edible when roasted and that cultivation for this purpose once was attempted. However, the seeds should not be eaten because they cause illness when only partially roasted. The clear oil pressed from the seeds has been used in some countries for making soap, for illumination, as a lubricant, and in paints.

The seeds have served in medicine under the names Barbados-nuts, purging-nuts, physic-nuts, Semen Ricini Majoris, and pignons d'Inde.

The plants are widely cultivated elsewhere from cuttings as a hedge or living fence. The deciduous foliage is unpalatable to livestock. Indians in the West Indies and Mexico were growing these plants around their houses when the first European explorers arrived. In Mexico a lac or varnish was obtained from scale insects propagated on the bark. An infusion of the leaves was used in Guatemala to set dyes of cotton. A honey plant.

Uncommonly planted around houses as an ornamental and escaping to clearings, roadsides, and waste grounds in Puerto Rico, Mona, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda. Apparently not native in Puerto Rico and the Virgin Islands but introduced long ago and now widespread in cultivation and naturalized locally. Grown from cuttings or seeds.

PUBLIC FORESTS.—Guánica, Maricao, Río Abajo.

RANGE.—Native of tropical America, planted by the Indians, and the original range uncertain. Now widely cultivated and naturalized in Bermuda, through West Indies, and continental America from southern Florida and Mexico to Argentina. Also introduced into Old World tropics and becoming naturalized.

OTHER COMMON NAMES.—tártago, piñón, piñón purgante (Puerto Rico, Spanish); physic-nut (Virgin Islands, English); purge-nut, curcas-bean, Barbados-nut (English); piñón botija, piñón de cercas (Cuba); sangregado, piñoncillo (Mexico); tempate (Central America); cotoncillo (Honduras); coquillo (Costa Rica, Panama); piñón de purga, tuatúa, frailecillo, frailejón (Colombia); médicinier, médicinier béni (Haiti); grave physic-nut, schijnoot (Dutch Antilles); schijtnoot (Surinam); pião, pião branco, pinhão bravo (Brazil); medicinier blanc (Dominica).

BOTANICAL SYNONYM.—*Curcas curcas* (L.) Britton & Millsp.

444. Tártago, physic-nut *Jatropha curcas* L.*

Flowers (upper left), leaf and fruits (right), two-thirds natural size.

445. Tabaiba ***Jatropha hernandiifolia* Vent.**

This vinelike shrub rarely reaching tree size is easily recognized by its distinctive leaves. Characters for identification include: (1) watery or slightly milky latex; (2) ovate leaves with petiole attached mostly above base of blade (peltate), short- or long-pointed at apex, sometimes with 1 or 2 additional points or lobes, dull green above and blue green beneath; (3) several whitish male and female flowers about $^3/_{16}$ inch long and broad on very slender widely forking stalks; and (4) nearly round seed capsules $^3/_4$ inch in diameter, splitting into 3 parts.

An evergreen shrub 5–10 feet high, also taller and vinelike, or treelike to 20 feet tall with slender stems to 2 inches in diameter, and few branches, without a definite crown, hairless throughout. The bark is smooth and light gray, the inner bark whitish and tasteless with nearly transparent slightly bitter latex. The slender twigs are greenish when young, turning gray or brown, with rounded raised leaf scars.

The alternate leaves have slender petioles 1–4 inches long attached mostly above the rounded or heart-shaped base of blade. The thin papery blades are mostly 2–5½ inches long and 1¼–3½ inches wide.

Flower clusters (cymes) 1–5 inches long at leaf bases bear several flowers, mostly male (monoecious). Male flowers have calyx or 5 rounded lobes, bell-shaped tubular white corolla with 5 spreading lobes, and 10 stamens in 2 series united in column. Female flowers have pistil with 3-celled ovary and forked stigma. The nearly round seed capsules, 1 or 2 on stalks of 2–3 inches, are whitish tinged with green, turning brown, and split into 3 parts. Seeds 3 or fewer, oblong, $^3/_8$ inch long, mottled brown. Flowering and fruiting irregularly through the year.

The wood is light brown or whitish and soft.

Uncommon in understory of moist limestone forest at low altitudes in Puerto Rico.

PUBLIC FORESTS.—Cambalache, Guánica, Vega Baja.

RANGE.—Puerto Rico and Hispaniola.

OTHER COMMON NAME.—papayo (Puerto Rico).

BOTANICAL SYNONYM.—*Curcas hernandiifolius* (Vent.) Britton. Closely related to *Jatropha divaricata* Sw., of Jamaica, which has thicker, soft leathery leaves with petiole attached at base of blade (not peltate.)

445. Tabaiba *Jatropha hernandiifolia* Vent.

Fruiting twig (above), male flowers (lower right), natural size.

446. Tártago emético, coralplant — *Jatropha multifida* L.

This handsome ornamental shrub or small tree occasionally spreads from cultivation and might be native in dry areas. It is easily recognized by: (1) abundant poisonous milky juice or white latex flowing from cut parts; (2) long-stalked leaves deeply palmately lobed with 11 or fewer lance-shaped lobes also divided and toothed; (3) many small red or scarlet flowers in flat-topped erect showy cluster on long stalk; and (4) yellow rounded slightly 3-lobed seed capsules about 1 inch long.

Shrub or small tree 15 feet high and 3 inches in trunk diameter or larger, apparently deciduous in dry areas, with few branches, each ending in a cluster of crowded leaves. The bark is brown, smooth, with many lenticels. The stout hairless twigs have large round leaf scars.

The alternate hairless leaves have stipules ½–¾ inch long, divided into brown threadlike segments. Petioles are 4–8 inches long, round. The thin blades have a rounded outline 6–12 inches across but are much divided into narrow long-pointed lobes ½–2 inches long, green above and whitish beneath.

Flower clusters (cymes) are erect on a stalk 4–8 inches long, branched at the top about 2½ inches across and flat, hairless throughout. Male flowers are numerous on slender spreading reddish stalks, nearly ½ inch across, composed of 5-lobed red calyx ⅛ inch long; 5 red spreading narrow curved petals ¼ inch long; disk of 5 glands united at base; and 8 red stamens ¼ inch long. Female flowers 2–3 near center of flower cluster, less than ¼ inch long, consist of calyx, corolla, and pistil with 3-celled 3-ovuled ovary and 3 styles each 2-forked. The capsules split into 3 parts, each with 1 elliptic mottled seed about ¾ inch long. Flowering and fruiting intermittently.

The seeds and milky sap are poisonous but have been used in home remedies. In southern Florida this species is considered to be a frequent cause of poisoning.

Uncommonly planted for ornament and along roadsides in Puerto Rico, Vieques, and the Virgin Islands in St. Croix, St. Thomas, and Tortola and escaping and naturalized locally. Possibly native in dry areas of southwestern Puerto Rico. Collected in the interior of Mona Island far from any present habitation, yet possibly introduced long ago. Propagated from cuttings and seeds.

PUBLIC FOREST.—Luquillo.*

RANGE.—Native home uncertain, apparently West Indies, possibly including Puerto Rico. Collected in Barbados in 1687 and perhaps native there. Now widespread and naturalized through West Indies, from southern Florida to Texas, in Hawaii, and from Mexico to Brazil and becoming naturalized. Also introduced in Old World tropics.

OTHER COMMON NAMES.—don tomás, maná, tãrtago (Puerto Rico); coralplant (Virgin Islands); piñón de España, piñón extranjero, yuca cimarrona (Dominican Republic); ceibilla, piñón vómico, piñón extranjero, castaño purgante (Cuba); cabalongo (Mexico); chicasquil (Costa Rica); tártago emético, coral (Colombia); emético vegetal (Venezuela); coralplant, physic-nut (English, United States); Spanish physic-nut, French physic-nut (Jamaica); French physic-nut (Barbados); médicinier espagnol, papaye sauvage, médicinier d'Inde (Haiti); coralplant, diez mandamentu (Dutch Antilles).

BOTANICAL SYNONYM.—*Adenoropium multifidum* (L.) Pohl.

447. Jagüerillo — *Phyllanthus juglandifolius* Willd.

A shrub or small tree to 15 feet high and 4 inches in diameter of distinctive form. The smooth gray trunk, sometimes stout, bears at the apex many slender horizontal branches or twigs 1–2 feet long with many alternate leaves in 2 rows. The slender twig enlarged at base and the leaves appear to be a pinnate compound leaf and all may shed together as one. Other characters are: (1) leaves oblong to lanceolate, 2–6 inches long and 1–1½ inches wide, long- to short-pointed at apex and rounded or slightly notched at base, not toothed on edges, thin, hairless, paler beneath, with petioles of about ⅛ inch; (2) small short-stalked whitish or greenish flowers less than 3/16 inch long at leaf bases, with 5 or 6 sepals and no corolla, the male with 6 stamens united below, and the female on same plant (monoecious) with 3-celled ovary and stalkless flat stigma; and (3) the brown seed capsules are ⅜ inch in diameter rounded but slightly flattened and 3-lobed, spltting into 3 parts, each with 2 dark brown elliptic seeds about 3/16 inch long. Flowering in spring and summer and fruiting in summer and autumn. Scattered and uncommon in forests at low and middle altitudes in Puerto Rico and reported long ago from St. Thomas. RANGE.—Cuba, Hispaniola, Puerto Rico, Trinidad, and South America from Venezuela and Guyana to Brazil, Peru, and Ecuador. OTHER COMMON NAMES.—grosella cimarrona (Cuba); quitasol (Ecuador). BOTANICAL SYNONYMS.—*Asterandra grandifolia* (L.) Britton, *Phyllanthus grandifolius* auth., not L.

446. Tártago emético, coralplant *Jatropha multifida* L.

Flowering twig (above), portion of fruit (lower right), two-thirds natural size.

448. Higüerito, castorbean ***Ricinus communis* L.***

Castorbean is an introduced large coarse herb or shrub sometimes becoming a small tree. It is easily recognized by: (1) the large star-like palmate-veined leaves with mostly 7–9 long pointed lobes bordered by irregular gland-tipped teeth and with very long round petiole joined below middle of blade; (2) small greenish flowers in terminal clusters, male below and female above; (3) the elliptic seed capsule about ¾ inch long, 3-lobed and usually spiny, splitting into 3 parts; and (4) the familiar castorbean ½–⅝ inch long, with whitish swelling at one end, oily but poisonous when eaten raw.

Evergreen large coarse herb or shrub, sometimes a small tree 15 feet or more in height and 4 inches in trunk diameter, with few branches, hairless throughout. In temperate regions a coarse annual herb. Bark light brown, smoothish, with rings at nodes and raised dots (lenticels), the inner bark light gray and tasteless. The stout greenish twigs are covered with a whitish bloom and have enlarged ringed nodes. The bud is covered by a long-pointed yellow-green stipule more than 1 inch long, which sheds early, leaving a ring scar.

The alternate leaves have very long stout petioles mostly 12–20 inches long, whitish green, rounded and hollow, joining the middle of the blade (peltate) and bearing 2 cup-shaped yellow-green glands at apex under blade. Blades are mostly 12–16 inches in diameter, sometimes smaller, thin, slightly saucer-shaped, deeply 7–9-lobed half way to petiole, the lobes on 1 side more than twice the length of the shortest. The upper surface is dull green with veins yellow green and slightly sunken. The lower surface dull light green with prominent veins.

Flower clusters (racemes) are erect at end of twigs and bear many short-stalked flowers without corolla, male below and female above (monoecious). The male flower develops from light green rounded bud ⅛ inch in diameter, covered by the calyx, and consists of the light green calyx with 3–5 long-pointed lobes bent down and many stamens with much branched filaments and dotlike light yellow anthers ⅜–½ inch long and broad. The greenish female flower less than ¼ inch long is composed of the light green 3–5-lobed calyx and the pistil with light green spiny 3-celled ovary, 3 ovules, and 3 spreading reddish-brown glandular styles each 2-forked.

The seed capsules are whitish green, becoming brown, usually covered with weak spines or smooth and split into 3 parts, each 1-seeded. The seed or castorbean is shiny brown with darker streaks or spots and a whitish enlargement at one end, resembling a tick or beetle. Flowering and fruiting throughout the year.

The wood is whitish and soft.

Castorbean is cultivated elsewhere for the oily seeds, which yield the caster-oil of commerce, a laxative and lubricant. The oil has been used also in soap making, for lighting homes, and as a hair dressing. However, raw seeds resembling ticks or beetles are poisonous and can cause death if eaten. If the flower stalks are removed before maturity of seeds, the risk of poisoning children is reduced.

An ornamental shrub or in temperate regions an annual herb. Several varieties differ in fruit and seed characters. One ornamental variety planted locally has reddish or purplish foliage.

Locally common in waste places, cultivated, escaped, and naturalized throughout Puerto Rico and Virgin Islands. Recorded from Icacos, Vieques, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARK.—Guajataca, Río Abajo, Susúa; Virgin Islands.

RANGE.—Native of tropical Africa but widely planted and naturalized in tropical and subtropical regions of the world. Naturalized through West Indies and in subtropical parts of southern continental United States from Florida to Texas, Arizona, and California. Northward grown as an annual herb and escaping from cultivation. Also from Mexico south to Brazil and Argentina.

OTHER COMMON NAMES.—higuereta, ricino (Puerto Rico, Spanish); higuerillo, higuero, palmacristi (Spanish); castorbean, castor-oil-plant (Virgin Islands, English); higuerillo blanco, higuerillo rojo (Guatemala); higuero blanco, higuero colorado (El Salvador); higuerilla colorada (Costa Rica); castor, rejalgar (Colombia); tártago (Venezuela, Argentina); higuerilla negra (Peru); oil-nut (Jamaica, Barbados); palma Christi (Barbados); ricin, palma-christi (French); castor-oil-plant, karpata, palma Christi (Dutch Antilles); carrapateira (Brazil); carpate (Dominica).

448. Higuerito, castorbean *Ricinus communis* L.

Fruits (above), leaf, and flowers (lower left), two-thirds natural size.

449. ***Sapium caribaeum* Urban**

A tree species of the Lesser Antilles known also from 2 localities in the Virgin Islands. Distinguishing characteristics are: (1) abundant milky sap, probably poisonous as in related species; (2) elliptic-lanceolate thin leaves 3–5½ inches long and 1¼–2½ inches wide, with relatively few side veins mostly curved toward border; and (3) rounded seed capsules nearly ¼ inch in diameter.

A small evergreen tree 20 feet high and 4 inches or more in trunk diameter, hairless throughout. Leaves alternate, the light green round petioles ¾–1 inch long with 2 glands at apex. Blades long-pointed at apex and rounded at base, with minute gland teeth on edges, thin or slightly thick and succulent, the upper surface green, and the lower surface dull light green.

Flower clusters (spikes) 4–10 inches long at ends of twigs bear many minute nearly stalkless flowers less than 1/16 inch long, mostly male and in lower part female (monoecious). Male flowers about 10 above a scale have 2-lobed calyx and 2 stamens. Female flowers borne singly have 2-lobed calyx and pistil with rounded ovary and 2 styles. The purplish seed capsules are mostly 2-lobed and contain 2 rounded seeds more than ⅛ inch long.

The whitish soft lightweight wood is not used.

Elsewhere, Indians made bird-lime from the sticky white sap.

Collected at Cinnamon Bay, St. John, about a century ago but not found there afterwards. Sterile specimens were obtained in the mountain or rain forest at the summit of Sage Mountain, Tortola, altitude 1,700 feet, by one of the authors in 1954 and 1972.

PUBLIC PARKS.—Virgin Islands (?), Sage Mountain.

RANGE.—Tortola, St. John, and Lesser Antilles in St. Kitts, Antigua, Guadeloupe, Dominica, Martinique, St. Lucia, and St. Vincent.

OTHER COMMON NAMES.—gumtree (Saba); bois de soie (Guadeloupe); bois-la-glu, glutier (Martinique); la glu (St. Lucia); la glu, lagl (Dominica).

449. *Sapium caribaeum* Urban

Flowering twig (above), fruiting twig (below), two-thirds natural size.

450. Tabaiba ***Sapium jamaicense*** **Sw**

This species of tabaiba is rare and local near Lares and in Luquillo Mountains at its eastern limit. It is characterized by: (1) abundant irritating and poisonous milky sap; (2) oblong or elliptic green leaves with many nearly straight to slightly curved parallel lateral veins almost at right angle to midvein, the edges minutely wavy-toothed, and 2 raised dotlike glands at upper end of petioles; (3) small yellow-green flowers stalkless along narrow axes at leaf bases, mostly male with a few female below (monoecious); and (4) seed capsules round, $\frac{5}{16}$ inch in diameter, 3-seeded.

Small to medium-sized evergreen tree to 50 feet high and 10 inches in trunk diameter, hairless throughout. Leaves alternate, with green petioles $\frac{3}{4}$–$1\frac{1}{4}$ inches long. Blades are mostly 6–9 inches long and $2\frac{1}{4}$–$2\frac{3}{4}$ inches wide, sometimes only 3 inches long and 1 inch wide, abruptly long-pointed at apex and blunt at base.

Flower clusters (spikes) 2–4, are 3–6 inches long, unbranched, at base of topmost leaves. Male flowers, in groups of 3–7 above a scale, about $\frac{1}{16}$ inch long and broad, yellow green, consisting of cup-shaped 2-toothed calyx and 2 stamens. Female flowers $\frac{3}{16}$ inch long, green, are composed of a cup-shaped 3-toothed caly: and pistil with 3-celled 3-ovuled ovary and 3 styles. Seed capsules are 3-celled and split int 3 parts. The seeds are about $\frac{3}{16}$ inch long.

Rare in northeastern Puerto Rico only a Rosario Tract in Luquillo Mountains at 600-800 feet altitude and near Lares in the mois limestone forest.

PUBLIC FOREST.—Luquillo.

RANGE.—Greater Antilles, southern Mexic (Chiapas), Guatemala, and Honduras.

OTHER COMMON NAMES.—lengua de vaca aburridero (Dominican Republic); lechuga piniche, lechero (Cuba); beyacca, gumtree milkwood (Jamaica); bois lait, bois brûlan (Haiti).

Apparently after reaching its eastern limit i Puerto Rico, this species of the Greater An tilles, Mexico, and Central America produce the local or endemic relative, No. 129, tabaiba *Sapium laurocerasus* Desf. That species i common and more widespread over the islan and ascends to higher altitudes. It differs i the darker more shiny leaves with side vein more nearly at right angle to midrib and mor prominent glands at upper end of petiole.

450. Tabaiba *Sapium jamaicense* Sw.

Twig with male flowers (upper left), twig with female flowers (lower left), fruiting twig (right), natural size.

451. Amansa guapo *Savia sessiliflora* (Sw.) Willd

Distinguishing characters of this shrub or small tree of dry areas are: (1) narrowly ovate leaves 1–3 inches long and $\frac{3}{4}$–$1\frac{1}{4}$ inches wide, alternate, almost stalkless, and light green; (2) minute yellow flowers male and female at leaf bases on different trees, male crowded and almost stalkless, female single on curved stalks; and (3) seed capsules rounded, brown or black, $\frac{5}{16}$ inch in diameter, splitting into 3 parts, each 2-seeded.

Deciduous shrub or small tree to 25 feet high and 4 inches in trunk diameter. The bark is gray, smooth to slightly fissured, with warts (lenticels). The inner bark is light pink beneath an outer green layer, bitter. The slender twigs are greenish and finely hairy when young, becoming brownish with raised dots (lenticels).

The alternate leaves have hairy leafstalks $\frac{1}{16}$ inch long and minute pointed stipules $\frac{1}{16}$ inch long. Blades are long-pointed at apex, rounded at base, without teeth on edges, thin, paler beneath, hairless except at base and along midvein beneath.

Flowers male and female at leaf bases on different trees (dioecious), with both sepals and petals. Male flowers less than $\frac{1}{8}$ inch broad, yellow, composed of 5 hairy sepals, 5 tiny petals, 5 stamens, and nonfunctioning pistil. Female flowers have 5 sepals, 5 tiny petals, and pistil with 3-celled ovary and 3 forking styles. Seed capsules hang down on curved stalks about $\frac{1}{4}$ inch long, split into 3 parts which fall off, the axis remaining attached. The dark brown rounded seeds are about $\frac{1}{8}$ inch in diameter. Flowering and fruiting irregularly during the year.

Wood is light brown, hard.

Uncommon and scattered in dry coastal and lower Cordillera forests of southwestern Puerto Rico from sea level to 500 feet altitude. Also Desecheo, Vieques, St. Croix, St. Thomas, St. John, and Jost Van Dyke.

PUBLIC FOREST AND PARKS.—Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Cuba, Hispaniola, Puerto Rico, and Virgin Islands. Recorded from Jamaica only from the type collection nearly two centuries ago.

OTHER COMMON NAMES.—carbonero de costa, garrote (Puerto Rico); ajorca-jíbara (Cuba).

451. Amansa guapo *Savia sessiliflora* (Sw.) Willd.

Fruiting twig (above), twig with female flowers (lower left), two-thirds natural size.

452. ***Securinega acidoton*** **(L.) Fawcett & Randle**

This small much-branched shrub with many small sharp spines sometimes becomes a small tree. Its distinguishing characters are: (1) very slender, very spiny, brown or gray zigzag twigs, much branched and almost forming a network; (2) very small leaves, crowded and alternate, obovate or elliptic, $\frac{1}{4}$–$\frac{5}{8}$ inch long; (3) minute yellowish flowers at leaf bases, many crowded male and few stalked female; and (4) seed capsules rounded, $\frac{3}{16}$ inch in diameter, splitting into 6 parts.

Much branched spreading, spiny deciduous shrub less than 10 feet high, sometimes tree-like and on Muertos a small tree to 20 feet high and 6 inches in trunk diameter. Bark light gray, smoothish, becoming rough, fissured, and slightly shreddy. The inner bark is pinkish and slightly bitter. The very spiny hairless twigs have minute light dots (lenticels) and end in spines or minute buds formed of scales (stipules) and young leaves. The spines are slender, straight, sharp, $\frac{1}{8}$–$\frac{3}{8}$ inch long, often appearing widely 2-forked, those from side twigs to $\frac{3}{4}$ inch long.

The leaves are alternate or on short lateral shoots crowded, hairless, with 2 minute brown scales (stipules) at base and with very slender leafstalk less than $\frac{1}{16}$ inch long. Blades are mostly obovate or elliptic, $\frac{1}{4}$–$\frac{5}{8}$ inch long, $\frac{1}{8}$–$\frac{3}{8}$ inch wide, rounded at apex, tapering to base, not toothed on edges, thin, the upper surface green and slightly shiny, the lower surface dull light green.

Flowers are male and female on the same plant (monoecious), minute, about $\frac{1}{16}$ inch wide, yellowish, without petals. Several to many male flowers are crowded and almost stalkless at leaf bases, composed of 5 round yellowish sepals, 5 stamens on a disk opposite the sepals, and minute nonfunctioning pistil. Female flowers are few at leaf bases on slender stalks about $\frac{1}{8}$ inch long, consisting of 5 rounded yellowish sepals and on a disk the pistil with 3-celled ovary and 3 spreading 2-forked styles. The rounded brown seed capsules contain 6 light yellow seeds $\frac{1}{16}$ inch long. With flowers and fruits in spring and summer.

The wood is light brown, hard, and fine-textured.

Locally common in dry coastal hills from sea level to 600 feet altitude in southwestern Puerto Rico and recorded from Coamo Springs by Britton and Wilson (*10*). Also Desecheo, Muertos, St. Croix and Buck Island, St. Thomas, Little St. James Island, St. John, and Virgin Gorda.

PUBLIC FOREST AND PARKS.—Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Bahamas, Greater Antilles, and Virgin Islands.

OTHER COMMON NAME.—green ebony (Jamaica).

452. *Securinega acidoton* (L.) Fawcett

Twig with female flowers (left), twig with male flowers (center), fruiting twig (right), natural size.

BOX FAMILY (BUXACEAE)

Shrubs, small trees, and herbs, known by: (1) evergreen leaves, opposite or sometimes alternate, simple, commonly entire, leathery, without stipules; (2) minute flowers crowded along an axis (spike or raceme), male and female on the same plant (monoecious) or different plants (dioecious), regular, the calyx generally with 4 (–12) sepals or lobes or sometimes none, without corolla, the male flowers with stamens 4 (or 6) opposite or many, the female few and larger with pistil composed of superior ovary generally of 3 cells each with 1–2 ovules, and 3 spreading styles; and (3) fruit a capsule or berrylike, the shiny black seeds with a fleshy protuberance (caruncle).

Key to species

A. Leaves ovate or elliptic, 2–4 inches long, with 3 main veins from base to long-pointed apex—453. *Buxus laevigata.*

AA. Leaves oblong or obovate, ¾–1½ inches long, with 2 faint side veins from base near edge to rounded apex—454. *Buxus vahlii.*

453. *Buxus laevigata* (Sw.) Spreng.

A rare shrub or small tree of western Puerto Rico, recognized by: (1) opposite ovate or elliptic leaves with 3 main veins from base; (2) small fragrant whitish or light yellow male and female flowers about ¼ inch long, without petals, in stalked clusters at leaf bases; and (3) rounded brown seed capsules about 3/16 inch long and broad, 3-horned, splitting into 3 parts.

Evergreen shrub or small tree to 20 feet high and 3 inches in trunk diameter, hairless throughout. Bark gray, thick, with corky ridges and deep fissures, light yellow within. The inner bark is light green and very bitter. The light green twigs are slightly 4-angled, slender, and brittle.

The opposite leaves without stipules have leafstalks ⅛–¼ inch long. Blades are 2–4 inches long and 1–2 inches wide, slightly thickened, long-pointed at apex, short-pointed at base, with 2 long side veins curved from base to apex near the turned down edges, bitter tasting but without odor. The upper surface is shiny green and the lower surface shiny light green.

Several to many male flowers and usually 1 female are borne in the same cluster (monoecious) at the end of a stalk less than 1 inch long. Male flowers ¼ inch long and broad have a stalk ⅛–⅜ inch long, 4 whitish or light yellow sepals ⅛ inch long and 4 stamens opposite the sepals. The slightly larger female flowers without stalk have 6 sepals less than 1/16 inch long and pistil with rounded 3-celled ovary and 3 long spreading styles. Seed capsule rounded and 6-angled, with 3 long curved horns (styles) of the same length at apex, splitting into 3 parts, each with 1 horn and 1-seeded. With flowers and fruits in spring and summer.

The wood is light yellow, hard, heavy, of very fine uniform texture. It would be suitable for articles of turnery and wood engravings, like that of the related box or boxwood of commerce (*Buxus sempervirens* L.)

Rare in moist limestone and western Cordillera (serpentine) forests at 300–2,000 feet altitude in western Puerto Rico.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Puerto Rico and Jamaica. Also Martinique and Venezuela.

BOTANICAL SYNONYMS.—*Tricera citrifolia* Willd., *Buxus citrifolia* (Willd.) Spreng.

453. *Buxus laevigata* (Sw.) Spreng.

Twig with male and female flowers (above), fruiting twig (below), natural size.

454. ***Buxus vahlii* Baill.**

This rare shrub or small tree is identified by: (1) opposite oblong or obovate slightly thickened leaves $\frac{3}{4}$–$1\frac{1}{2}$ inches long and $\frac{3}{8}$–$\frac{5}{8}$ inch wide, with 2 faint side veins curved from base near edge to the rounded apex, which ends in minute narrow point; (2) small whitish or yellowish male and female flowers without petals, in clusters almost stalkless at leaf bases; and (3) seed capsules $\frac{3}{16}$–$\frac{1}{4}$ inch long, 3-horned, splitting into 3 parts.

Evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter, hairless throughout. Bark gray, finely fissured, the inner bark light brown and bitter. Twigs light green, becoming light gray, with 2 grooves below each leaf, ending in bud composed of minute paired leaves.

Leaves opposite, with leafstalks $\frac{1}{16}$ inch long, without stipules, with bitter taste but no odor. Blades are stiff and leathery, slightly convex, short-pointed at base, and slightly turned under at edges. The upper surface is green and slightly shiny, with sunken midvein and 2 faint side veins curved near border, and the lower surface dull light green.

The flowers are male and female in the same cluster (monoecious), with 4 sepals less than $\frac{1}{8}$ inch long and no petals. Flowering and fruiting from spring to fall.

The wood is yellowish and hard.

This species might be suitable as a hedge plant, having attractive foliage like that of the related box or boxwood of commerce, (*Buxus sempervirens* L.), also a cultivated ornamental.

Rare in moist limestone forest at 200–500 feet altitude on hills of Puerto Rico. Collected near Rincón, Ponce, and Bayamón. Also St. Croix.

RANGE.—Puerto Rico and St. Croix only. An early report from Jamaica has not been confirmed.

BOTANICAL SYNONYM.—*Tricera vahlii* (Baill.) Britton.

The specific name commemorates Martin Hendriksen Vahl (1749–1804), Danish botanist, who first described this and several other tree species from Puerto Rico and the Virgin Islands.

454. *Buxus vahlii* Baill.

Flowering twig (left), fruiting twig (right), natural size.

CASHEW FAMILY (ANACARDIACEAE)

Trees, shrubs, and few woody vines, known by: (1) resinous sap often in bark and other parts, in a few species the resin or volatile oil caustic and poisonous to the skin; (2) leaves alternate, odd pinnate, with 3 leaflets, or simple, without stipules; (3) flowers minute or small, commonly white, many in large branched clusters (panicles), bisexual or functionally male or female, mostly regular, with 3–5 sepals united at base, 3–5 petals or none, generally 10 stamens, sometimes fewer, inserted at the border of a ringlike or cuplike disk, and pistil with superior ovary generally 1-celled (to 5-celled) with 1 ovule, style, and 3 stigmas; and (4) fruit mostly a resinous drupe, 1-seeded, the resin of few species poisonous. Also vol. 1, p. 286.

Key to species

A. Leaves simple.
  B. Leaves elliptic or obovate, rounded at both ends or slightly notched at apex—130. Pajuil, cashew, *Anacardium occidentale* L.
  BB. Leaves lance-shaped, long-pointed at both ends—131. Mango, *Mangifera indica* L.*
AA. Leaves pinnately compound.
  C. Leaflets 5 or 7.
    D. Leaflets usually 5 (3–7), stalked, ovate, blunt or minutely notched at apex; sap poisonous to the touch—132. Papayo, Florida poisontree, *Metopium toxiferum* (L.) Krug & Urban.
    DD. Leaflets 5 or 7, stalkless, elliptic or oblong, slightly toothed toward short-pointed apex; sap resinous—457. *Schinus terebinthifolia.**
  CC. Leaflets 9 to many.
    E. Leaflets spiny-toothed; sap poisonous to the touch—*Comocladia.*
      F. Leaflets 11–21, broadly ovate, ⅜–¾ inch long and broad, each bearing 3 or more sharp slender spines—455. *Comocladia dodonaea.*
      FF. Leaflets 11–31, oblong or lance-shaped, 2½–7 inches long, with many spiny teeth—456. *Comocladia glabra.*
    EE. Leaflets 9–25, not spiny; sap not poisonous—*Spondias.*
      G. Leaflets mostly lance-shaped, long- or short-pointed at apex, with short stalks about ⅛ inch long.
        H. Leaflets inconspicuously toothed—133. Jobo de la India, ambarella, *Spondias dulcis* Parkinson.
        HH. Leaflets not toothed—134. Jobo, hogplum, yellow mombin, *Spondias mombin* L.
      GG. Leaflets elliptic, rounded or short-pointed at apex, slightly wavy-toothed, almost stalkless—135. Ciruela del país, purple mombin, *Spondias purpurea* L.*

455. Chicharrón — *Comocladia dodonaea* (L.) Urban

This spiny shrub or small tree with few branches and no crown should be learned because its sap of leaves, twigs, and bark is poisonous to the skin of many persons. It is easily identified by: (1) pinnately compound leaves 3–6 inches or more in length crowded near ends of twigs and composed of 11–21 stalkless broadly ovate leaflets, folded or wrinkled and often reddish tinged, each bearing 3 or more sharp slender spines; (2) many tiny stalkless dark red flowers more than 1/16 inch across, in clusters along a lateral flower stalk; and (3) the orange-red elliptical fleshy fruits ⅜–½ inch long, several along a stalk.

Commonly a shrub 10 feet or less in height but becoming a small tree 15 feet high and 4–6 inches in trunk diameter, with slender axis and few branches. The bark is light brown, slightly fissured, and thin. Inner bark is light brown and tasteless. The sap turns blackish on exposure and makes a lasting stain. The stout brown twigs are densely hairy when young, slightly rough from the raised half round leaf scars. The bud is composed of minute hairy leaves without scales.

The evergreen leaves are alternate but near ends of twigs are very close together. The yellow-green leaf axes are densely brown hairy. Leaflets are paired except at end, broadly ovate, mostly ⅜–¾ inch long and broad, slightly thickened. The short-pointed apex ends in a sharp slender yellow spine about ⅛ inch long, the 2–4 main veins end in similar spines, and the base is heart shaped. The upper surface is slightly shiny green and hairless, and the lower surface paler and sometimes hairy on veins.

Flower clusters (panicles) have a lateral axis 2–4½ inches in length. Groups of tiny red flowers are almost stalkless along the main axis or on short branches less than ½ inch long. Flowers are male or female and bisexual on the same plant (polygamous). The minute calyx is 3-lobed; the corolla is composed of 3 dark red petals, widely spreading and more

455. Chicharrón *Comocladia dodonaea* (L.) Urban

Natural size.

than $\frac{1}{16}$ inch across; male flowers have 3 stamens; and female flowers have an ovary with 3 minute stigmas. The elliptical or oblong fruits (drupes) contain 1 seed $\frac{3}{16}$ inch long. Flowering in winter and spring and maturing fruits in spring and summer.

Sapwood is light brown and hard.

Locally common in open areas and thickets in the dry and moist limestone forests and dry foothills of Puerto Rico from sea level to 1,000 feet altitude, especially in the southwestern part and limestone hilltops in the northwestern part. Also throughout the other islands including Mona, Desecheo, Muertos, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Guánica, Maricao, Susúa, Vega, Estate Thomas; Buck Island Reef, Virgin Islands, Gorda Peak.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, and Lesser Antilles from Anguilla and St. Martin to St. Vincent and the Grenadines.

OTHER COMMON NAMES.—maíz pelado, maíz tostado, carrasco, prapra (Puerto Rico); Christmas-tree, Christmas-bush (St. Croix); thumbtack, poison-ash (Tortola); guao (Dominican Republic); brésillet (Haiti); houx (St. Barts); red-man, centepee plant (Dutch Antilles); brazil (The Grenadines).

Called Christmas-tree in St. Croix because the leaflets are often reddish tinged as well as green. The spiny leaflets and red berrylike fruits resemble holly.

This species is related to poison-ivy of continental United States and should be avoided by all who are susceptible to that plant. The sap contains a caustic oil that produces similar skin irritation and eruption upon contact.

456. Carrasco — *Comocladia glabra* (Schultes) Spreng.

This odd poisonous shrub or small tree (or vinelike) of the forest understory easily recognized by: (1) slender unbranched erect trunk (sometimes with 2 or 3 branches) bearing at the top a cluster of large spreading pinnate leaves with 11–31 oblong or lance-shaped spiny-toothed leaflets; (2) the tiny dark red flowers $\frac{1}{16}$ inch across, crowded along branched lateral clusters 5–10 inches long; and (3) the elliptic fleshy fruits $\frac{3}{8}$ inch long, reddish, turning black. The whitish sap of foliage and bark, which turns blackish upon exposure, irritates the skin of some persons upon contact.

Evergreen and commonly a shrub at high elevations but elsewhere becoming more than 20 feet tall and 2 inches in trunk diameter. The light gray bark is fissured or rough. Inner bark is whitish and almost tasteless, with poisonous sap. The stout axis is light brown at apex and slightly hairy when young.

The leaves 1–2 feet long are alternate though crowded. Along the stout, light green, finely hairy axis are 11–31 almost stalkless leaflets in pairs except at end. Leaflet blades are $2\frac{1}{2}$–7 inches long and $\frac{7}{8}$–2 inches wide or smaller near base of leaf, with a long spiny point and the base rounded and slightly heart-shaped, stiff and thickened, hairless except on midrib, dark green on upper surface, and yellow green beneath. Lateral veins are at right angles to midrib, very prominent on lower leaflet surface, and end in needlelike spines $\frac{1}{16}$–$\frac{1}{8}$ inch long.

Flowers are male and bisexual on the same plant (polygamous). They have a 3-lobed calyx, 3 round dark red petals about $\frac{1}{32}$ inch long, 3 stamens, and a pistil with rounded ovary and 3 stigmas, or sometimes the parts in 4's. Male flowers have calyx, corolla, 3 larger stamens, and no pistil. Flowering and fruiting intermittently.

The sapwood is hard and light brown and is not used.

Common in most forest types except the dry southwestern coast and at 1,000-4,000 feet altitude in Puerto Rico. Absent from other islands.

PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro, Vega.

RANGE.—Hispaniola and Puerto Rico.

OTHER COMMON NAMES.—guao (Puerto Rico); guao, chicharrón (Dominican Republic); brésillet (Haiti).

The caustic sap upon contact with the skin produces irritation and eruption similar to that of the related poison-ivy of continental United States.

456. Carrasco *Comocladia glabra* (Schultes) Spreng.

Leaf (above), twig with flowers and fruits (below), one-half natural size.

457. Pimienta de Brasil, Christmas-berry, Brazil peppertree ***Schinus terebinthifolia*** **Raddi***

This attractive ornamental shrub or small tree is rarely planted for its clusters of many bright red fruits 3/16 inch in diameter. Other distinguishing characteristics are: (1) pinnate leaves with mostly 5, 7, or 9 (3–13 or more in varieties) stalkless elliptic or oblong leaflets paired except the largest at end, slightly toothed toward short-pointed apex; and (2) clusters of many small flowers about 1/8 inch broad across the 5 white petals.

Evergreen shrub or small tree becoming 20 feet high and 8 inches in trunk diameter. The bark is smooth and gray. Twigs are light brown, finely hairy when young, and have many raised dots (lenticels). They have aromatic resinous sap which turns blackish upon exposure. The buds are formed by minute hairy leaves without stipules.

The alternate pinnate leaves 3–6 inches long have a narrowly winged axis 1–3 inches long, green and finely hairy. Leaflets are 1–2 inches long and 1/2–3/4 inch wide (the terminal to 3 inches by 1 inch), short-pointed at both ends, with small blunt teeth toward apex, slightly thickened, hairless or nearly so, the upper surface shiny green with several straight lateral veins, and the lower surface dull light green.

Flower clusters (panicles) are mostly at base of upper leaves, 1–3 inches long, branched, composed of many short-stalked flowers, partly male and female on different plants (dioecious). The flower consists of calyx of 5 minute, pointed, green sepals; corolla of 5 white petals less than 1/8 inch long; 10 stamens attached at the base of a large ring-shaped disk; and pistil with rounded ovary, short style, and stigma. The bright red fleshy fruits (drupes) have sepals at base and dot stigma at apex. The aromatic resinous brown pulp encloses 1 elliptic light brown seed less than 1/8 inch long. Flowering and fruiting intermittently.

Rarely planted for ornament in Puerto Rico, escaping in moist limestone forest. Also St. John. Propagated from seeds and cuttings.

Uncommon in cultivation in tropical gardens. Introduced into southern Florida including Florida Keys and naturalized locally as a weed. Because of the evergreen foliage and red berries resembling holly, the branches are popular for Christmas decorations. Also in southern Arizona, southern California, and Hawaii. A honey plant. It is reported that this species causes a skin irritation in some persons.

RANGE.—Native of Brazil, Paraguay, and Argentina. Widely introduced northward to Central America and southern border of United States and in the Old World tropics.

OTHER COMMON NAMES.—copal (Cuba); chichita (Argentina); Brazil peppertree, Christmas-berry (United States); aroeira, aroeira negra, aroeira da praia (Brazil).

Varieties differing mainly in foliage, including number and shape of leaflets, have been named.

CYRILLA FAMILY (CYRILLACEAE)

Shrubs and trees, mostly small, sometimes large, known by: (1) leaves alternate, simple, mostly leathery, without stipules; (2) minute flowers clustered along an axis (raceme), bisexual, regular, with 5 sepals united at base and persistent, 5 petals united at base or separate, 5 or 10 stamens, and pistil composed of superior ovary with 2–4 cells each with 1–2 ovules, short style, and 2 stigmas; and (3) fruit a capsule or berrylike drupe, often angled or winged. Vol. 1, p. 298.

One species: 136. Palo colorado, swamp cyrilla, *Cyrilla racemiflora* L.

457. Pimienta de Brasil, Christmas-berry, Brazil peppertree *Schinus terebinthifolia* Raddi*

Flowering twig (above), fruiting twig (below), natural size.

HOLLY FAMILY (AQUIFOLIACEAE)

Shrubs and trees, small to medium-sized, rarely large, known by: (1) alternate simple leaves generally leathery and evergreen, with minute stipules or none; (2) small flowers, few in lateral clusters, whitish or greenish, generally male and female on different plants (dioecious) or bisexual, regular, composed of calyx with 4 (5) minute sepals or teeth, 4 (5) rounded whitish petals sometimes united at base, 4 (5) alternate stamens inserted at base of corolla, without disk, and pistil with superior ovary of 4 (3–5) cells of 1–2 ovules, usually without style and with 3–5 stalkless stigmas; and (3) fruit a round drupe or berry, red, black, or yellow, with stalkless stigmas, bitter pulp, and 3–5 nutlets.

Key to species

A. Leaves toothed on edges.
  B. Leaves narrowly ovate, long-pointed, sharply saw-toothed, ¾–1¾ inches long—461. *Ilex macfadyenii.*
  BB. Leaves mostly obovate or oblong, blunt or short-pointed at apex.
    C. Leaves with edges usually slightly wavy toothed and turned under, 2–4 inches long—462. *Ilex nitida.*
    CC. Leaves often sharply toothed toward apex, 1½–3 inches long—458. *Ilex cassine.*
AA. Leaves not toothed on edges.
  D. Leaves mostly less than 1 inch long; flowers 1 or few at leaf bases, 4–5-parted—465. *Ilex sintenisii.*
  DD. Leaves mostly more than 1 inch long; flowers clustered at leaf bases.
    E. Leaves short- or long-pointed at apex, 1–1¾ inches long—459. *Ilex cookii.*
    EE. Leaves mostly rounded at apex.
      F. Flowers 5–7-parted; leaves 1¼–2½ inches long—464. *Ilex sideroxyloides.*
      FF. Flowers 4-parted.
        G. Leaves elliptic, mostly blunt at base, 1¼–2½ inches long—466. *Ilex urbaniana.*
        GG. Leaves short-pointed at base.
          H. Leaves oblong or obovate, 1½–4 inches long—460. *Ilex guianensis.*
          HH. Leaves obovate to elliptic, 1–1½ inches long—463. *Ilex riedlaei.*

458. Dahoon — *Ilex cassine* L.

Dahoon, a small tree of southeastern continental United States, extends into the West Indies and has been discovered in Puerto Rico at its southeastern limit. This relative of the hollies is characterized by: (1) oblong or oblanceolate leathery leaves broadest and often sharply toothed toward the short-pointed or blunt apex; (2) few or several small whitish flowers at leaf bases, more than ⅛ inch across the 4 rounded corolla lobes; and (3) round bright red fruits nearly ¼ inch in diameter.

A small evergreen tree to 25 feet high and 6 inches in trunk diameter, sometimes shrubby. The bark is dark gray and rough. Twigs are slender, densely hairy, becoming dark brown, ending in minute pointed hairy buds.

The alternate leaves have petioles about ¼ inch long, often slightly hairy. Blades are 1½–3 inches long and ½–1 inch wide, gradually narrowed to base, slightly thickened, hairy when young, especially beneath, becoming hairless except on midvein beneath, shiny dark green above, and light green beneath.

Flowers on short hairy stalks at leaf bases in branching clusters (like cymes) to 1 inch long, male and female on different plants (dioecious). The calyx is composed of 4 pointed minute greenish sepals with hairy edges, and corolla of 4 spreading rounded whitish lobes more than 1/16 inch long. Male flowers have 4 stamens attached near base of corolla between lobes; and female flowers, usually only 3, have 4 sterile stamens and short pistil with 4-celled ovary and broad flat stigma. The berry (berry-like drupe) has calyx at base and dotlike stigma at apex and contains usually 4 nutlets 3/16 inch long, pointed and ridged. Flowering in spring.

The wood is described as lightweight, hard, fine-textured, with thick whitish sapwood and light brown heartwood.

In Florida this native relative of holly is recommended as a hardy evergreen for its bright red berries (only on female trees) in winter. It grows best though slowly in moist soils with some shade and is suited to lake shores and wet areas, also streets and roadsides. Propagated from cuttings.

Rare in coastal swamps of moist coastal forest at sea level near Dorado in northern Puerto Rico. Not listed by Britton and Wilson (*10*) but found by one of the authors as a range extension of the southeastern limit.

RANGE.—Coastal plain of southeastern United States from Virginia to Florida including Florida Keys and Texas. Also Bahamas, Cuba, and Puerto Rico. Also a variety (var. *mexicana* (Turcz.) Loes.) in Mexico.

OTHER COMMON NAMES.—yanilla blanca (Cuba); dahoon, dahoon holly, Christmasberry (United States).

458. Dahoon *Ilex cassine* L.

Twig with male flowers (upper left), twig with fruits (upper right), twig with female flowers (lower right), natural size.

459. ***Ilex cookii*** **Britton & Wils.**

This shrub or small tree local at the summit of Cerro de Punta, Puerto Rico's highest mountain peak, is characterized by: (1) elliptic leaves ¾–1¾ inches long and ⅜–⅞ inch wide, thick and stiff; (2) flowers few at leaf bases, ⅛ inch across the 4 white petals; and (3) round fruits less than 3/16 inch in diameter.

An evergreen shrub 5–8 feet high, sometimes becoming a small tree to 20 feet high and 5 inches in trunk diameter, hairless. Bark light brown with light dots (lenticels). Twigs slender, light green, becoming gray.

Leaves alternate, with light green petioles ⅛–¼ inch long. Blades short- or long-pointed at apex and short-pointed or rounded at base, slightly turned under at edges, the upper surface shiny dark green with sunken midvein and inconspicuous side veins, and the lower surface dull light green.

Flowers few on slender stalks about ⅛ inch long at leaf bases. Female flowers have 4–5 minute sepals, 4–5 spreading white petals about 1/16 inch long, and pistil with ovary and 4–5 dotlike stigmas. Fruits (drupes) green when immature, 5-celled, with 5 blackish nutlets, and with stigmas and sepals persistent. Flowering irregularly over the year.

Rare and local in dwarf forest of upper Cordillera forest at and near summit of Cerro de Punta, in the central mountains at 4,000–4,390 feet altitude.

PUBLIC FOREST.—Toro Negro.

RANGE.—Known only from Cerro de Punta, Puerto Rico.

This rare species named in 1926 was discovered by Henry Allan Gleason and Melville Thurston Cook (1869–1952) on March 18, 1926, during perhaps the first ascent by botanists of Puerto Rico's highest peak. These specialists from the United States were making a survey of the vegetation of Puerto Rico (*12, 25*). Cook was botanist and plant pathologist at the Agricultural Experiment Station at Rio Piedras from 1923 to 1940.

459. *Ilex cookii* Britton & Wils.

Fruiting twig (above), flowering twig (below), natural size.

460. Macoucoua ***Ilex guianensis*** **(Aubl.) Kuntze**

This rare small tree of mountain forests is characterized by: (1) oblong or obovate thick leathery leaves 1½–4 inches long and ¾–1½ inches wide, rounded or blunt at apex, short-pointed at base; (2) many small white flowers ⅛ inch across the 4 petals, clustered at leaf bases; and (3) round fruits (drupes) less than ¼ inch in diameter, red to black.

Small evergreen tree to 30 feet high and 6 inches in trunk diameter or a shrub. Bark gray, smoothish. Twigs gray, hairless or finely hairy.

The alternate hairless leaves have petioles ⅛–⅜ inch long. The blades are slightly turned under at edges, have midvein slightly sunken and side veins inconspicuous, and lower surface paler.

Male flowers many, in branched clusters ½ inch across at leaf base, consisting of minute 4-lobed calyx, corolla of 4 white petals 1/16 inch long, and 4 stamens. Female flowers on different plants (dioecious), several at leaf base, have calyx, corolla, minute stamens, and pistil with rounded ovary and flattened stigma. Fruits (drupes) few at leaf bases on slender stalks about ⅛ inch long, with calyx at base and stigma at apex, containing few nutlets.

The whitish wood is hard.

Rare in moist limestone and lower Cordillera forests at 200–1,000 feet altitude in western Puerto Rico.

PUBLIC FORESTS.—Cambalache, Guajataca, Maricao, Río Abajo, Susúa, Vega.

RANGE.—Hispaniola, Puerto Rico, Dominica, and Trinidad. Also from Mexico and British Honduras through Central America to Colombia, Venezuela, French Guiana, and Brazil.

OTHER COMMON NAMES.—waterwood, white-wood (British Honduras); sapo-balli (Guyana); palo blanco (Nicaragua).

BOTANICAL SYNONYM.—*Ilex panamensis* Standl.

460. Macoucoua *Ilex guianensis* (Aubl.) Kuntze

Twig with female flowers (upper left), twig with male flowers (upper right), twig with fruits (lower right), natural size.

461. Acebo de sierra ***Ilex macfadyenii*** **(Walp.) Rehd.**

This small tree rare in upper mountain forests is easily distinguished from the other native species of its genus by its long-pointed toothed leaves. Characters for recognition are: (1) small narrowly ovate leaves ¾–1¾ inches long and ½–1 inch wide, long-pointed, and sharply saw-toothed; (2) 1 to few flowers at leaf bases, 5–7 parted, more than ⅛ inch across the spreading white petals; and (3) round red fruits ¼ inch in diameter, with flat stigmas at apex.

Evergreen shrub or small tree to 40 feet high and 10 inches in trunk diameter. Bark gray, smooth to fissured, with raised dots, covered by mosses and liverworts. Inner bark light gray, bitter. Twigs slender, when young light green, finely hairy, and slightly angled, becoming light gray and slightly fissured. Buds about 1/16 inch long, pointed, green, composed of minute leaves.

Leaves alternate, with minute paired stipules and slender light green leafstalks ⅛–3/16 inch long, finely hairy. Blades narrowly ovate or sometimes lanceolate, hairless, border of short narrow teeth pointed toward long narrow apex, base rounded, very slightly thickened and leathery with side veins not visible. The upper surface is dark green and slightly shiny, the 2 sides bent up from midrib, the lower surface dull light green.

Flowers mostly male and female, 1 to few at leaf bases on slender stalks, often branched, to ⅜ inch long. The minute calyx is light green, 5–7-toothed, and the corolla of 5–7 spreading elliptic whitish petals. Male flowers have 5–7 alternate stamens and nonfunctioning pistil. Female flowers have small nonfunctioning stamens and pistil with rounded ovary and 5–7 flat stigmas. The fruits (drupes) with calyx at base and flat stigmas at apex are green when immature, turning red. With flowers from spring to fall and fruits in fall and winter.

The wood is whitish, hard, and moderately heavy.

Rare in upper Cordillera and upper Luquillo forests, also dwarf forest, at high altitudes of 1,500–4,000 feet in Puerto Rico.

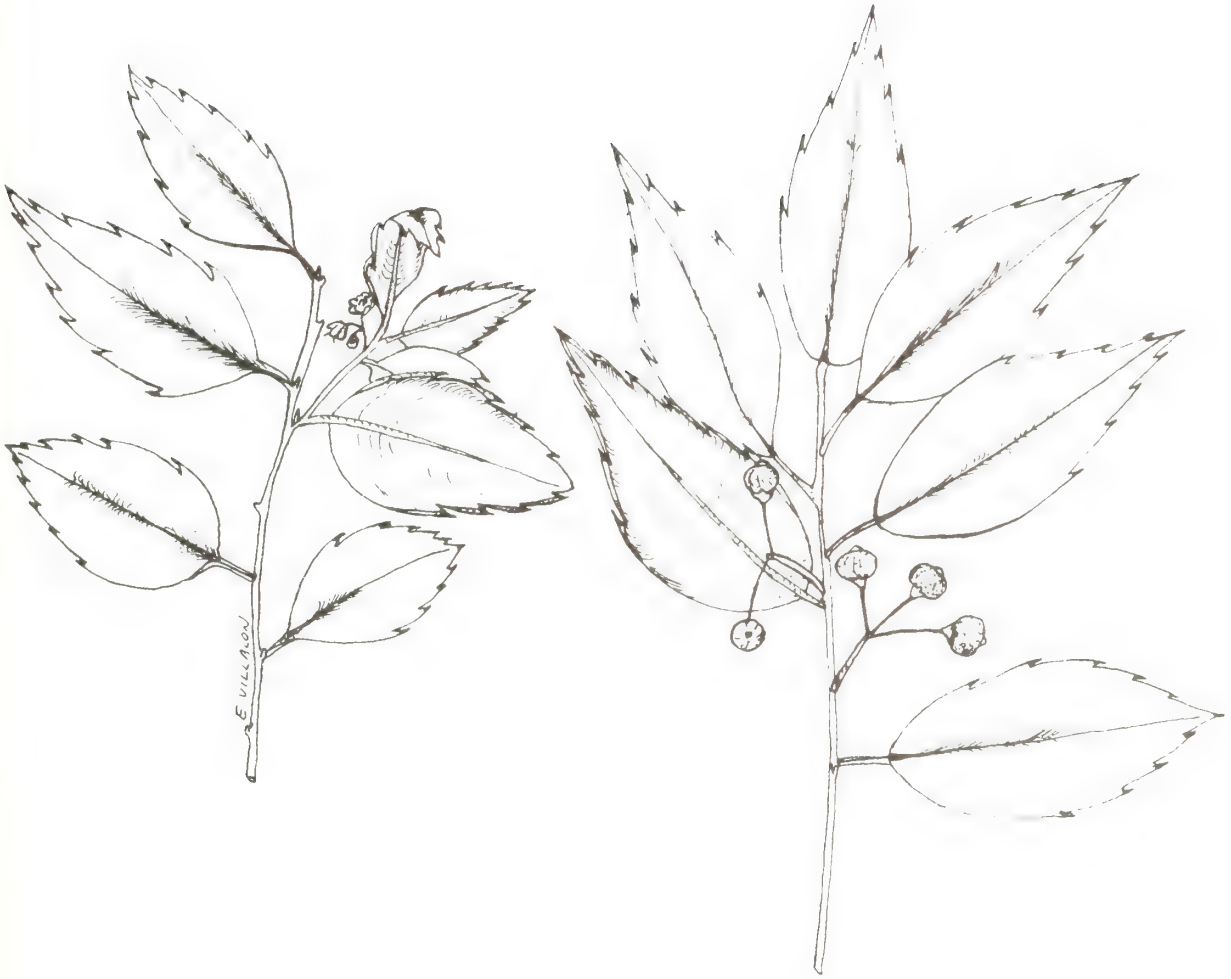
PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Greater Antilles and Lesser Antilles from St. Kitts to Nevis, Guadeloupe, Dominica, and Martinique.

OTHER COMMON NAMES.—palo blanco (Dominican Republic); graines vertes pruneau, petit citronnier (Guadeloupe); ti citron (Dominica); houx (Haiti).

BOTANICAL SYNONYM.—*Ilex montana* (Sw.) Griseb., not Torr. & Gray.

The scientific name honors James Macfadyen (1798–1850), Scotch and Jamaican botanist and author of a flora of Jamaica.



461. Acebo de sierra *Ilex macfadyenii* (Walp.) Rehd.

Flowering twig (left), fruiting twig (right), natural size.

462. ***Ilex nitida*** **(Vahl) Maxim.**

A small to medium-sized tree of mountain forests characterized by: (1) obovate or elliptic shiny green leathery leaves 2–4 inches long and 1–2 inches broad, blunt-pointed or rounded at apex, the edges usually slightly wavy toothed and turned under; (2) small whitish flowers less than ¼ inch across, several short-stalked in clusters at leaf bases; and (3) rounded bright red (or blackish) fleshy fruits 5/16 inch in diameter.

An evergreen tree commonly 20–40 feet high but reaching 60 feet in height and 14 inches in trunk diameter with buttresses to 2 feet, hairless throughout. The light gray bark is smoothish to scaly and thin. Inner bark is whitish and slightly bitter. The twigs are green, with raised dots (lenticels).

The leaves are alternate on leafstalks ¼–⅜ inch long. Leaf blades are usually broadest beyond middle, short-pointed at base, sometimes almost without teeth on edges, and paler beneath.

The flowers are mostly male and female on different trees but some flowers are bisexual (polygamo-dioecious), in lateral clusters on stalks ⅛–¼ inch long. The calyx is less than 1/16 inch long, slightly 4–5-lobed; there are 4 or 5 whitish wide spreading petals more than ⅛ inch long, united at base; stamens as many as petals, attached to base of corolla; and in female flowers, pistil with 4-celled ovary with 4-lobed stalkless flat stigma. Fruits (drupes) are 1 to 4 together at a node and contain 4 brown nutlets 3/16 inch long. Flowering and fruiting intermittently.

The sapwood is whitish and hard. The wood is described as lightweight, tough, and easily worked. Elsewhere reported as used in carpentry.

Uncommon in moist limestone and lower and upper Cordillera forests at 200–3,000 feet altitude in northern foothills and upper western mountains of Puerto Rico.

PUBLIC FORESTS.—Cambalache, Guajataca, Guánica, Maricao, Río Abajo, Toro Negro.

RANGE.—Cuba, Jamaica, Puerto Rico, and Lesser Antilles in Montserrat, Guadeloupe, and Martinique. Also local in Mexico.

OTHER COMMON NAMES.—briqueta, briqueta naranjo, cuero de sapo, hueso prieto, palo de murta (Puerto Rico); citronnier blanc, graines vertes, pruneau noir, pruneau (Guadeloupe); bois de houe (Martinique).

462. *Ilex nitida* (Vahl) Maxim.

Fruiting twig (above), twig with female flowers (below), natural size.

463. ***Ilex riedlaei* Loes.**

This shrub or small tree of mountains in western Puerto Rico is characterized by: (1) small obovate to elliptic leaves mostly 1–1½ inches long and ½–1 inch wide, rounded and notched at apex, short-pointed at base, thick and stiff with edges turned under; (2) many small white 4-parted flowers ⅛ inch wide crowded at leaf bases and back of leaves; and (3) round red to black fruits 3/16 inch in diameter, with calyx at base and dotlike stigma at apex.

Shrub or small tree to 20 feet high and 5 inches in trunk diameter, hairless. Bark gray, smoothish, slightly warty. Inner bark with green outer layer, orange streaked, gritty, bitter. Twigs are slender and slightly angled when young, green becoming gray.

The alternate leaves have slender leafstalks ⅛ inch long. Blades have side veins inconspicous, dark green and slightly shiny on upper surface and light green beneath. Leaves on rapidly growing young plants are up to 2½ inches long and 1½ inches wide and have few short teeth near apex.

Many flowers, mostly male and female on different plants, are crowded at leaf bases and at nodes back of leaves on slender stalks 1/16–⅛ inch long. Male flowers have calyx with 4 rounded lobes, 4 elliptic white petals united at base, 4 alternate stamens, and nonfunctioning pistil. The many fruits (drupes) have dotlike slightly 4-lobed stigma at apex and are juicy and bitter. The color changes from green to dark red to reddish black. Flowering and fruiting irregularly during the year.

Wood whitish, hard.

Uncommon and local in upper Cordillera forest, also dwarf forest, at 2,000–4,390 feet altitude in western Puerto Rico. In dwarf forest at summit of Cerro de Punta, highest peak on the island.

PUBLIC FORESTS.—Maricao, Toro Negro.

RANGE.—Puerto Rico and Hispaniola.

This species was named for Anselme Riedlé (c1775–1801), who discovered it while collecting plants in Trinidad, St. Thomas, and Puerto Rico in 1796–1798. It is closely related to *Ilex urbaniana* Loes. and perhaps only a variety of that species.

463. *Ilex riedlaei* Loes.

Flowering twig (above), fruiting twig (lower right), natural size.

464. Gongolín ***Ilex sideroxyloides* Griseb.**

A rare tree of Puerto Rican mountains, distinguished by: (1) shiny dark green leathery, obovate or elliptic leaves 1¼–2½ inches long and ½–1 inch broad, rounded or blunt-pointed at apex and long-pointed at base, the edges turned under and the veins indistinct; (2) few small whitish flowers less than ¼ inch across in lateral clusters 5–7-parted; and (3) round red fruits 5/16 inch in diameter.

Small to medium-sized tree to 40 feet in height and 7 inches in trunk diameter, with straight trunk and narrow crown, hairless throughout. The bark is gray and smooth or slightly rough, the light brown inner bark gritty and slightly bitter. The slender twigs are green when young, turning brown.

The evergreen leaves are alternate on leafstalks ⅛–¼ inch long. Leaf blades often have a minute sharp point at apex and are broadest beyond middle and pale on the lower surface.

The few flowers are located at leaf bases on stalks ¼–½ inch long, partly male and female on different trees and partly bisexual (polygamo-dioecious). The calyx is less than 1/16 inch long, slightly 5–7-toothed; the whitish corolla of 5–7 elliptic petals more than ⅛ inch long and united near base; stamens as many as petals; and ovary 4-celled with stalkless flat stigmas. The fleshy fruits (drupes) single or paired at leaf bases have 4 brown nutlets ¼ inch long. Flowering from spring to fall, the fruit maturing from summer to winter.

Sapwood is whitish and hard. The wood is whitish or sometimes brownish, hard, and moderately heavy (specific gravity 0.77). Elsewhere, the wood has been used in carpentry.

Rare in upper Cordillera and upper Luquillo forests at 1,500–2,500 feet altitude in Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Puerto Rico, and Lesser Antilles from St. Kitts and Nevis to St. Vincent and Grenada.

OTHER COMMON NAMES.—gongolín, gongolí (Puerto Rico); white birch (Montserrat); ticitron (Dominica); bois citron, citronnier, citronnier blanc (Guadeloupe).

464. Gongolín *Ilex sideroxyloides* Griseb.

Fruiting twig (above), flowering twig (lower left), natural size.

465. ***Ilex sintenisii*** **(Urban) Britton**

This rare shrub or small tree of the upper Luquillo forest and dwarf forest of Luquillo Mountains is identified by: (1) small, obovate or elliptic leaves $\frac{3}{8}$–$1\frac{1}{8}$ inches long, $\frac{1}{4}$–$\frac{3}{4}$ inch wide, rounded and notched at apex, thick and stiff with edges turned under; (2) flowers 1 or few at leaf bases, 4–5-parted, $\frac{5}{16}$ inch across the spreading white petals; and (3) round fruits $\frac{3}{16}$ inch in diameter, with conical stigmas at apex.

Evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter. Bark gray, smooth, covered with mosses and liverworts. Twigs slender, light green, becoming gray, hairless. Buds composed of minute light green leaves.

The alternate hairless leaves have tiny paired stipules and light green curved leafstalks $\frac{1}{8}$–$\frac{1}{4}$ inch long. Blades are short-pointed at base, the upper surface dark green, slightly shiny or dull, with midrib slightly sunken and side veins scarcely visible, the lower surface dull light green with side veins not visible.

One or few flowers are borne at leaf bases on slender stalks $\frac{1}{4}$–$\frac{3}{8}$ inch long, mostly male and female. Female flowers are composed of minute green calyx with 4–5 lobes; corolla of 4–5 elliptic white petals slightly united at base; 4–5 alternate small nonfunctional stamens; and pistil with 4-celled ovary and broad, flattened, conical stigmas. Male flowers have similar calyx and corolla with larger stamens and small nonfunctional pistil. The fruits (drupes), green when immature, have calyx at base and stigmas at apex. Flowering and fruiting throughout the year.

Rare in upper Luquillo forest and dwarf forest of Luquillo Mountains including Sierra de Naguabo at altitudes of 3,000–3,500 feet.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from high mountains of eastern Puerto Rico, where it was discovered by P. Sintenis.

Closely related to *Ilex obcordata* Sw. of Cuba, Jamaica, and Hispaniola.

465. *Ilex sintenisii* (Urban) Britton

Twig with male flowers (left), fruiting twig (center), twig with female flowers (right), natural size.

466. Cuero de sapo ***Ilex urbaniana* Loes.**

This rare shrub or small tree known only from mountain forests of Puerto Rico and Tortola is identified by: (1) small elliptic leathery leaves 1¼–2½ inches long, rounded or notched at apex and mostly blunt at base; (2) 4-parted white flowers ¼ inch wide, clustered at leaf bases; and (3) rounded fruits (drupes) about ¼ inch in diameter.

Evergreen shrub or small tree to 30 feet high and 4 inches in trunk diameter. Twigs slender, finely hairy to nearly hairless.

Leaves alternate, hairless, with petioles ¼–⅜ inch long. Blades blunt or short-pointed at base, not toothed on edges.

Flowers clustered at leaf bases, 1–3 on a short stalk about ¼ inch long, mostly male and female on different plants (dioecious). Calyx 4-toothed, 1/16 inch long; corolla of 4 narrow spreading white petals less than ⅛ inch long, slightly united at base; stamens 4; and pistil with round ovary and flattened stigma. Fruits have thin pulp and few bony nutlets.

Rare in upper Cordillera forest at about 3,000 feet altitude in western Puerto Rico. Also Sage Mountain, altitude about 1,700 feet, Tortola.

PUBLIC FOREST AND PARK.—Toro Negro; Sage Mountain.

RANGE.—Known only from Puerto Rico and Tortola.

This species honors Ignatz Urban (1848–1931), botany professor at Berlin, Germany. He was a specialist on West Indian plants and author of "Flora Portoricensis" (77).

BITTERSWEET FAMILY (CELASTRACEAE)

Shrubs, woody vines, and trees mostly small, known by: (1) leaves alternate or opposite, sometimes whorled, simple, with minute stipules or none; (2) minute flowers mostly in clusters (cymes) with stalks mostly jointed, greenish, bisexual or functionally male and female, regular, with 4–5 sepals united at base and persistent, 4–5 petals, 4–5 alternate stamens inserted on or below the large disk, and pistil with superior ovary (sometimes surrounded by disk and appearing inferior) of 2–5 cells each with 2 ovules, short style, and stigma often 2–5-lobed; and (3) fruit a capsule, berry, or drupe, the seed generally with colored covering (aril).

Key to species

A. Leaves opposite or mostly so; fruit fleshy (drupe; except No. 475).
  B. Leaves thick and stiff, with side veins inconspicuous; twigs mostly round.
    C. Leaves elliptic, 1–4 inches long, rounded to short-pointed at both ends, edges slightly turned under and sometimes with few teeth—467. *Cassine xylocarpa.*
    CC. Leaves obovate, 1–2½ inches long, rounded at apex and gradually narrowed to long-pointed base, with edges turned under; fruit a 4-lobed capsule—475. *Torralbasia cuneifolia.*
  BB. Leaves slightly thickened, with side veins distinct, often wavy on edges; twigs very slender, slightly 4-angled, often branching in pairs.
    D. Leaves elliptic to obovate, 1¼–2 inches long, blunt, rounded or notched at apex; flowers ⅛ inch wide, whitish; fruits elliptic, blue black—469. *Gyminda latifolia.*
    DD. Leaves mostly ovate to rounded, ½–1½ inches long, blunt or short-pointed at apex; flowers ⅛ inch wide, reddish; fruit orange red to deep red—468. *Crossopetalum rhacoma.*
AA. Leaves alternate; fruit a capsule (except No. 474).
  E. Leaves and twigs pale yellow green, leaves mostly elliptic and short-pointed, 1–2 inches long, slightly thickened, with network of many fine veins; fruits (drupes) orange red or red, nearly ¼ inch in diameter—474. *Schaefferia frutescens.*
  EE. Leaves and young twigs greenish, twigs mostly turning gray, leaves mostly thick and leathery—*Maytenus.*
    F. Leaves oblong, 1½–3½ inches long, about 3 times as long as wide—472. *Maytenus elongata.*
    FF. Leaves mostly elliptic, about twice as long as wide.
      G. Leaves 1–2 inches long, rounded at apex, gray green—470. *Maytenus cymosa.*
      GG. Leaves 1½–4 inches long, mostly blunt at apex.
        H. Leaves shiny yellow green on upper surface; seed capsule round, ¼ inch wide, whitish—473. *Maytenus ponceana.*
        HH. Leaves slightly shiny green on upper surface; seed capsule elliptic, ⅜–½ inch long—471. *Maytenus elliptica.*

466. Cuero de sapo *Ilex urbaniana* Loes.

Flowering twig, natural size.

467. Coscorrón, marble-tree ***Cassine xylocarpa* Vent.**

This common shrub or small tree widespread on coasts and lowland thickets is recognized by: (1) leaves mostly opposite and elliptic, commonly small but varying greatly in size and shape, very thick and stiff, sometimes with few teeth, light green; (2) small greenish-white or yellowish flowers clustered at leaf bases, 3/16 inch across, 5-parted; and (3) elliptic or rounded fruit 3/4–1 1/4 inches long, yellow or greenish yellow, slightly fleshy and hard.

Evergreen shrub or sometimes a small tree to 35 feet high and 8 inches in trunk diameter, hairless throughout. Bark gray, smooth to finely fissured, the inner bark purplish or pinkish and slightly bitter. Twigs slender, light green, becoming gray brown.

Leaves mostly opposite, sometimes alternate, with minute paired pointed stipules 1/16 inch long shedding early and light green petioles about 1/4 inch long. Blades mostly elliptic, sometimes obovate, commonly small, mostly 1–4 inches long and 1/2–2 1/2 inches wide but smaller in dry areas and larger in wet areas, rounded to short-pointed at both ends, very thick and stiff, edges slightly curved under and sometimes with few teeth, side veins few and inconspicuous, upper surface light green and slightly shiny, lower surface dull whitish green.

Flower clusters (panicles) 3/8–1 inch long at leaf bases bear several to many small slightly fragrant flowers, male and female on different plants (dioecious). Female flowers have calyx with 5 spreading teeth, corolla of 5 spreading pointed petals, 5 minute alternate nonfunctional stamens inserted under a flat disk, and pistil composed of 3-celled ovary with 2 tiny ovules in each cell, style, and 3-lobed stigma. Male flowers have larger stamens and minute pistil.

The fruit (drupe) is greenish but becomes yellow at maturity. It varies in shape from narrowly elliptic to nearly round and has thin flesh, a large hard thick-walled stone, and 3 or fewer cells and elliptic seeds 3/8 inch long. With flowers and fruits intermittently through the year.

The wood is light brown, hard, heavy, fine-textured, strong and reported to be fairly durable.

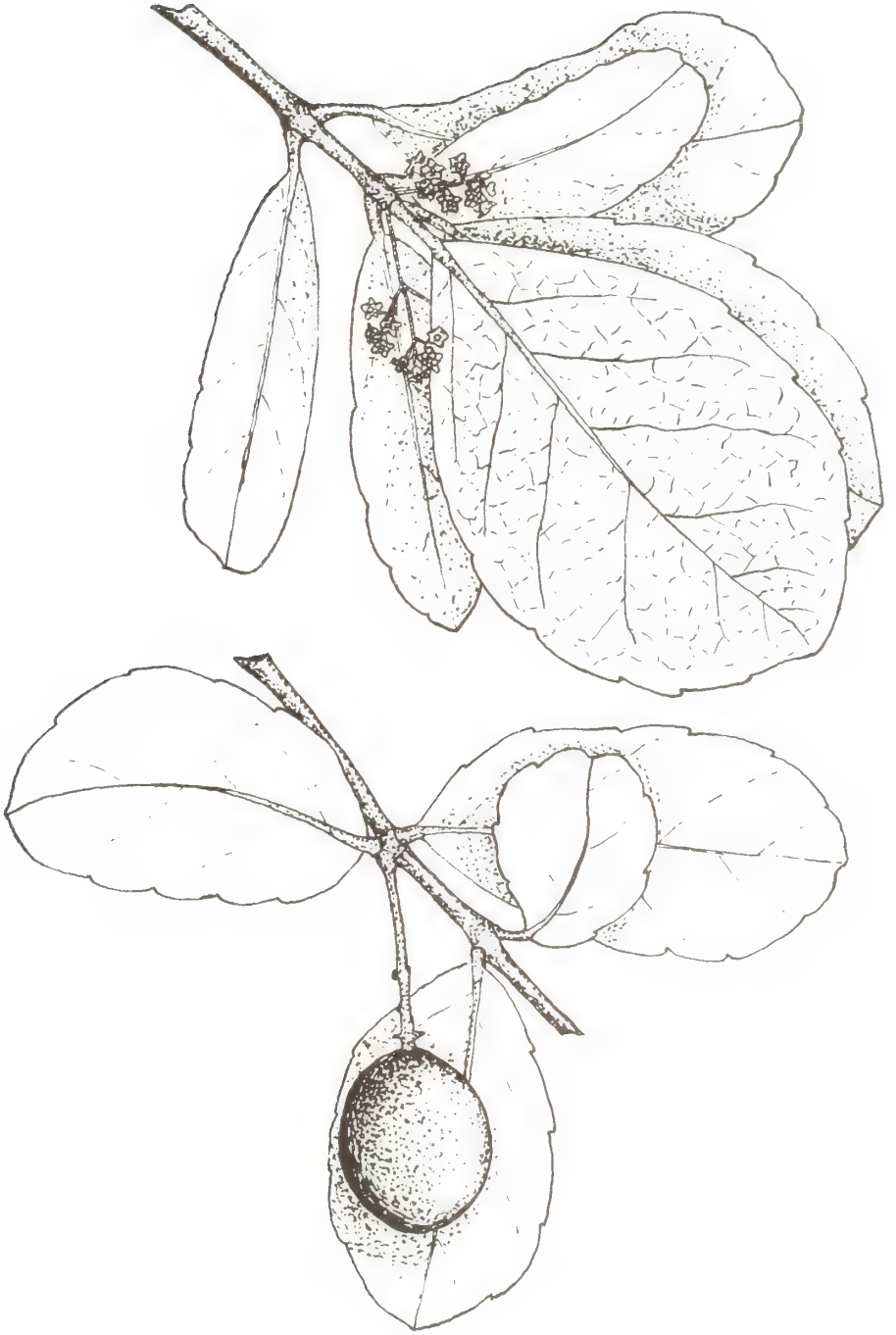
Common and widely distributed in coastal dry and moist forests from sea level to 600 feet altitude. Along coasts, such as sandy beaches and in thickets and openings in forests in Puerto Rico and most adjacent islands. Muertos, Icacos, Vieques, Culebra, Culebrita, St. Croix and Buck Island, St. Thomas, St. John, Jost Van Dyke, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Aguirre, Cambalache, Guajataca, Guánica, San Juan, Susúa; Buck Island Reef, Virgin Islands.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, Martinique, St. Vincent, and The Grenadines. Also Mexico, Panama (San José Island), and Venezuela.

OTHER COMMON NAMES.—guayarote, guayabote (Puerto Rico); poisontree, wild nutmeg (British Virgin Islands); mate prieto, pinipinche de sabana, pinipiní (Cuba); marble-tree, spoon-tree, nut muscat (English); bois tan, prune bord de mar (Martinique).

BOTANICAL SYNONYMS.—*Elaeodendron xylocarpum* (Vent.) DC., *E. attenuatum* A. Rich. Several varieties based upon shape and size of fruits and leaves have been named. This generic name has been spelled also *Elaeodendrum*.



467. Coscorrón, marble-tree *Cassine xylocarpa* Vent.

Flowering twig (above), fruiting twig (below), natural size.

468. Coral, Florida crossopetalum ***Crossopetalum rhacoma* Crantz**

This shrub sometimes becoming a small tree is common and widespread in dry areas. It is identified by: (1) paired small light green leaves mostly ovate to rounded, usually finely wavy on edges; (2) tiny 4-parted reddish flowers less than 1/8 inch across, clustered at leaf bases; and (3) orange-red to deep red egg-shaped fruits about 1/4 inch long, 1-seeded.

Shrub or sometimes small tree to 20 feet high and 3 inches in trunk diameter, or larger, much branched, evergreen or sometimes deciduous. The bark is gray, finely fissured and slightly shedding in thin plates. Inner bark is light brown or pinkish, fibrous and almost tasteless. The very slender twigs, often paired, are light green and slightly 4-angled when young, becoming gray, hairless.

The leaves are opposite or sometimes in 3's, hairless, and have short petioles less than 1/16 inch long. Blades are of varying shapes, mostly ovate to rounded, sometimes narrowly oblong, 1/2–1 1/2 inches long and 3/8–1 1/4 inches wide, blunt or short-pointed at apex and rounded or short-pointed at base, finely wavy on edges, slightly thickened and leathery, dull yellow green on both surfaces or paler beneath.

The flower clusters (cymes) 1/2–7/8 inch long bear several short-stalked flowers at the end of a slender reddish stalk. The minute calyx is greenish red, finely hairy, and has 4 rounded lobes; petals 4, less than 1/16 inch long, reddish, rounded and curved; stamens 4, inserted between lobes of disk and alternate with petals; and pistil with 4-celled 4-ovuled ovary, short style, and 4 minute stigmas. Fruits (drupes) few, slightly 1-sided, with calyx at base and style at side of apex, slightly fleshy, containing a large stone and 1 or 2 seeds. Flowering and fruiting irregularly through the year.

The sapwood is light brown and hard.

Common and widely distributed in coastal, dry, and moist forests of Puerto Rico from sea level to 600 feet altitude and throughout the other islands. Mona, Muertos, Icacos, Culebra, St. Croix, St. Thomas, St. John, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Aguire, Cambalache, Guajataca, Guánica, Río Abajo, San Juan, Vega; Buck Island Reef, Virgin Islands.

RANGE.—Southern Florida including Florida Keys and from Bahamas through West Indies south to St. Lucia. Collected at Bermuda in 1875 but not afterwards. Also southern Mexico, Colombia, Venezuela, and Dutch Antilles.

OTHER COMMON NAMES.—manto, maravedí, palo de paloma, pico de paloma (Puerto Rico); limonejo (Cuba); membrillo (Venezuela); Florida crossopetalum (United States); poison-cherry (Jamaica); ti bonbon rouge (Guadeloupe); bonbon rouge (Martinique); placa chiquitu, palu di pushi (Dutch Antilles).

BOTANICAL SYNONYM.—*Rhacoma crossopetalum* L.

468. Coral, Florida crossopetalum *Crossopetalum rhacoma* Crantz

Natural size.

469. Coscorroncito, West Indies falsebox ***Gyminda latifolia*** **(Sw.) Urban**

A common small tree of coastal lowlands, characterized by: (1) very slender twigs, slightly 4-angled, branching in pairs; (2) leaves paired, small, elliptic to obovate, 1¼–2 inches long, ½–1 inch wide, blunt, rounded or notched at apex, slightly thickened; (3) small flowers ⅛ inch wide, whitish, 4-parted, few in clusters at leaf bases, male and female on different trees; and (4) elliptic fruit about ¼ inch long, blue black, fleshy, 1-seeded.

Small evergreen tree to 20 feet high and 4 inches in trunk diameter, hairless. Bark gray, finely fissured and scaly. Inner bark light pink, slightly bitter. Twigs very slender, slightly 4-angled, branching in pairs, light green, becoming light gray.

Leaves opposite, with minute paired stipules forming the bud. Leafstalks slender, very short, ⅛ inch long. Blades gradually narrowed to base, slightly turned under and often slightly wavy at edges, with inconspicuous veins, dull light green on both surfaces.

Flowers few at end of very slender stalk at leaf bases. Male flowers are composed of minute 4-lobed light green calyx, 4 spreading white petals, 4 alternate stamens, and minute nonfunctional pistil. Female flowers on other trees (dioecious) have calyx, 4 petals, and pistil with 2-celled ovary, each cell with 1 ovule, and no style. Fruits (drupes) have calyx at base, thin flesh, thick-walled stone, and 1 seed. With flowers and fruits irregularly during the year.

Wood light brown, hard.

Common in coastal and moist limestone forests from sea level to 800 feet altitude, northern and western Puerto Rico. Also Mona, Muertos, Piñeros, Vieques, St. Thomas and Anegada.

PUBLIC FORESTS.—Cambalache, Guajataca, Guánica, Maricao, Susúa, Vega.

RANGE.—Florida including Florida Keys and from Bahamas through West Indies south in Lesser Antilles from St. Martin to St. Vincent. Also Mexico.

OTHER COMMON NAMES.—araña, mala mujer (Puerto Rico); amansa guapo (Cuba); West Indies falsebox, false-boxwood (United States); petit mérisier (Martinique).

469. Coscorroncito, West Indies falsebox *Gyminda latifolia* (Sw.) Urban

Twig with male flowers (above), twig with female flowers and fruits (below), natural size.

470. ***Maytenus cymosa*** **Krug & Urban**

Rare small tree confined to eastern Puerto Rico and a few islands eastward, identified by: (1) alternate elliptic to obovate leaves 1–2 inches long and $\frac{5}{8}$–$1\frac{1}{2}$ inches wide, stiff and leathery, gray green; (2) small flowers $\frac{1}{8}$ inch broad, 5-parted, crowded at leaf bases; and (3) seed capsules elliptic, $\frac{3}{8}$ inch long.

Small evergreen tree to 25 feet high and 6 inches in trunk diameter, hairless. Bark blackish or dark gray, finely fissured. Inner bark pink to deep red, bitter. Twigs slender, slightly angled.

Leaves alternate, with leafstalks $\frac{1}{8}$–$\frac{1}{4}$ inch long. Blades rounded at apex, short-pointed at base, slightly turned down at edges, with few inconspicuous veins, paler beneath.

Flower clusters (cymes) have several crowded almost stalkless flowers composed of 5-toothed calyx; corolla of 5 pale yellow rounded petals; 5 minute alternate stamens inserted under a disk; and pistil with 2-celled ovary, short style, and stigma slightly 2-lobed. Fruit a blackish seed capsule, splitting in 2 parts. Seeds 1 or more in fleshy red covering. Flowering in spring and with fruits in spring and summer.

Wood whitish, slightly hard.

Rare in coastal moist forests of lowlands below 100 feet altitude in eastern Puerto Rico (for example, near Fajardo), and islands eastward. Also Piñeros, Vieques, St. Croix, St. Thomas, and Virgin Gorda.

PUBLIC PARK.—Gorda Peak.

RANGE.—Known only from eastern Puerto Rico to the Virgin Islands listed above.

470. *Maytenus cymosa* Krug & Urban

Fruiting twigs (above and lower right), flowering twig (lower left), natural size.

471. Cuero de sapo ***Maytenus elliptica*** **(Lam.) Krug & Urban**

This shrub or tree of the moist limestone forest is characterized by: (1) alternate elliptic leaves 1½–4 inches long and ¾–2 inches wide, slightly thick and leathery, turned up slightly from midvein, and slightly shiny green on upper surface; (2) small yellowish green flowers ⅛ inch across, 5-parted; and (3) seed capsules elliptic, ⅜–½ inch long, orange, 2-celled.

Evergreen shrub or usually small tree to 45 feet high and 10 inches in trunk diameter, hairless throughout. Bark gray, smooth to slightly fissured, the inner bark pink or turning deep red and slightly bitter. Twigs slender, light green and angled when young, turning gray with many raised dots (lenticels).

Leaves alternate, with minute paired stipules and light green leafstalks ¼ inch long. The elliptic blades are blunt or rounded at apex, short-pointed at base, not toothed on edges, with few inconspicuous veins, the lower surface dull light green.

Flowers are few or single on slender stalks ⅛ inch long at leaf bases, slightly fragrant, composed of 5-toothed green calyx; corolla of 5 yellow-green spreading pointed petals; 5 minute alternate stamens inserted under a dark red disk; and pistil with 2-celled ovary partly within disk, 2 ovules in each cell, short style, and stigma slightly 2-lobed. Seed capsules 1 or 2 at base of a leaf, splitting into 2 parts. Seeds few, elliptic, nearly ¼ inch long, with fleshy covering. Probably flowering intermittently. Collected with fruits in February and April.

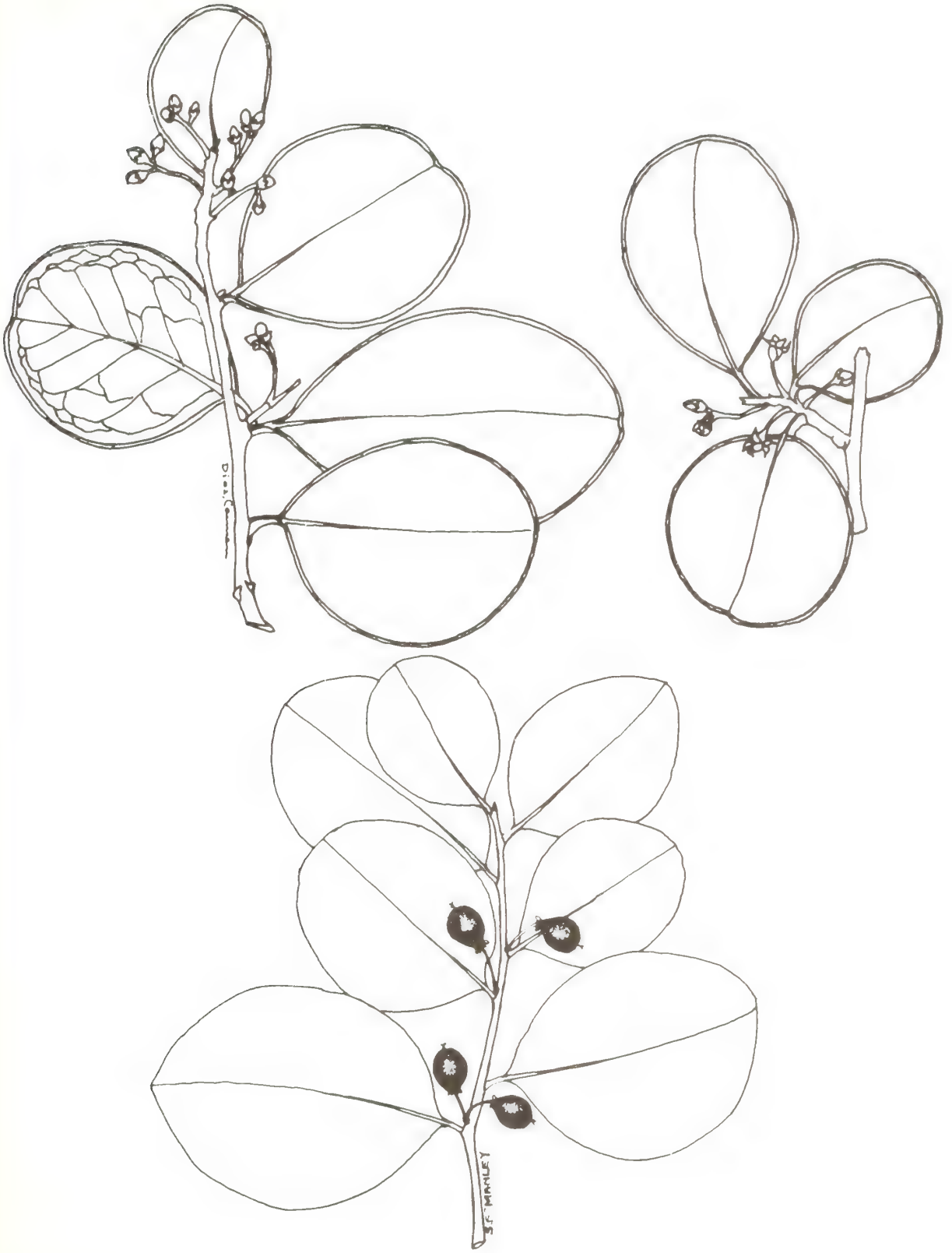
Wood light brown, slightly hard.

Common in moist limestone forest at 100–800 feet altitude in northern and northwestern Puerto Rico. Also Piñeros, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Río Abajo, Vega; Virgin Islands.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, and through Lesser Antilles from St. Martin and St. Barts to Grenada.

OTHER COMMON NAMES.—white cinnamon (Grenadines); albulito (Dominican Republic); bois citron (Martinique).



471. Cuero de sapo *Maytenus elliptica* (Lam.) Krug & Urban

Flowering twigs (above), fruiting twig (below), natural size.

472. ***Maytenus elongata*** **(Urban) Britton**

This rare tree known only from western Puerto Rico and Luquillo Mountains is characterized by: (1) alternate oblong leathery leaves 1½–3½ inches long and about ½–1½ inches wide; and (2) elliptic green seed capsules ¼–⅜ inch long.

Evergreen tree to 20 feet high (recorded to 40 feet) and 5 inches in trunk diameter, or a shrub of 10 feet. Inner bark deep red. Twigs slender, hairless.

Leaves alternate, hairless, with petioles 3/16 inch long. Blades more than twice as long as wide, short-pointed at both ends, not toothed on edges, with side veins inconspicuous, paler beneath.

The flowers have not been described. Fruits single or clustered at leaf bases on stalks ⅛–½ inch long, with minute style at apex and 5 minute sepals at base. Seed capsules in this genus 1–3-celled with 3 or fewer seeds in a fleshy cover (aril). Collected with fruits in February and July.

Rare in moist limestone and lower Cordillera forests at 500–2,500 feet altitude, also Luquillo Mountains (El Verde).

PUBLIC FORESTS.—Guajataca, Luquillo, Maricao, Susúa.

RANGE.—Known only from Puerto Rico.

This species is related to No. 471, cuero de sapo, *Maytenus elliptica* (Lam.) Krug & Urban, which has wide distribution at low altitudes in Puerto Rico and adjacent islands and which has larger and relatively broader leaves. The local species apparently evolved here from its widespread relative.

472. *Maytenus elongata* (Urban) Britton

Flowering twig, natural size.

473. ***Maytenus ponceana* Britton**

A rare tree known only from Puerto Rico, characterized by: (1) elliptic to ovate leaves, 2–3 inches long and 1–1½ inches wide, thick and leathery, turned up slightly at midrib, the upper surface shiny yellow green; and (2) seed capsules 1–3 at leaf bases or on twigs back of leaves, round, whitish, ¼ inch in diameter.

An evergreen tree to 40 feet high and 5 inches in trunk diameter. The twigs are slender, hairless, and slightly crooked, light green when young, becoming gray.

The alternate leaves have short petioles ⅛–¼ inch long. Blades are gradually narrowed to blunt apex, rounded at base, not toothed on edges, hairless, with few indistinct veins, the lower surface dull light green.

Flowers have not been described. The fruits (capsules) have slender stalks about ⅛ inch long and remains of calyx at base and dotlike style at apex, light green but becoming whitish, splitting into 3 parts. There is 1 rounded light brown seed less than $^{3}/_{16}$ inch in diameter. Collected with fruits in February and April.

Rare in moist limestone and lower Cordillera forests at 500–2,000 feet altitude in foothills through Puerto Rico, for example, near Arecibo and Lares.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo.

RANGE.—Known only from Puerto Rico.

This species was first collected by N. L. Britton on Río Portugués north of the city of Ponce in 1923 and was described by him the next year. The names honor the early Spanish explorer of Florida and first governor of Puerto Rico, Juan Ponce de León (c1460–1521).

473. *Maytenus ponceana* Britton

Fruiting twig, natural size.

474. Jiba, Florida-boxwood ***Schaefferia frutescens* Jacq.**

This shrub or small tree common and widespread at low altitudes, especially in dry forests, is easily recognized by: (1) the pale yellow-green color of both leaf surfaces and the slender twigs; (2) the small leaves mostly elliptic and short-pointed but varying to lanceolate and obovate; (3) small 4-parted yellow-green flowers 3/16 inch wide, scattered at leaf bases; and (4) orange-red or red rounded fleshy fruits nearly 1/4 inch in diameter.

Evergreen shrub or small tree to 30 feet high and 5 inches in trunk diameter, elsewhere reported to become a medium-sized tree to 45 feet high and 1 foot in trunk diameter. Bark light gray, smoothish to finely fissured, sometimes rough and furrowed. Inner bark is light yellow and almost tasteless. The twigs are slender and slightly angled, hairless, pale yellow green but afterwards becoming light gray.

The alternate leaves are mostly 1–2 inches long and 1/2–1 inch wide, sometimes to 2 1/2 inches long and 1 1/4 inches wide, gradually narrowed to nearly stalkless base or leafstalk 1/8 inch long, hairless, not toothed on edges, slightly thickened and leathery, with network of many fine veins.

Flowers are male and female on different plants (dioecious), single or clustered at leaf bases on short stalks 1/8 inch long. Male flowers have minute 4-lobed calyx, 4 greenish-white petals nearly 1/8 inch long, and 4 alternate stamens inserted below a disk. Female flowers have calyx and corolla and pistil with 2-celled ovary, short style, and 2-lobed stigma. The fruits (drupes) have calyx at base, style at apex, slightly bitter pulp, and 2 light brown seeds. Flowering and fruiting probably irregularly through the year.

The wood is light brown to yellow, hard, moderately heavy, and fine-textured. Elsewhere it has served as a substitute for boxwood in wood engraving.

Common and widespread on moist and dry limestone forests and coastal hills and southern foothills of Cordillera at 100–1,000 feet altitude through Puerto Rico. Also through the smaller islands, including Mona, Piñeros, Icacos, Vieques, Culebra, St. Croix and Buck Island, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Guánica, Río Abajo, Susúa, Vega; Buck Island Reef, Virgin Islands.

RANGE.—Florida including Florida Keys and from Bahamas through West Indies south to Grenada. Also southern Mexico, Colombia, and Venezuela.

OTHER COMMON NAMES.—cafeíllo (Puerto Rico); cabra cimarrona, cabra, palo de araña (Dominican Republic); cafecillo, amansa guapo, jasmín, mije (Cuba); limoncillo (Colombia, Venezuela); fruta de paloma (Venezuela); Florida-boxwood, yellowwood, boxwood (United States); petit bois blanc, bois capable, bois petit garçon (Haiti); merisier (St. Barts); boxwood (Dutch Antilles).

474. Jiba, Florida-boxwood *Schaefferia frutescens* Jacq.

Fruiting twig (above), twig with male flowers (center right), twig with female flowers (below), natural size.

475. Boje ***Torralbasia cuneifolia*** **(C. Wright) Krug & Urban**

This shrub or small tree of dwarf forests of mountain summits is identified by: (1) small obovate leaves, thick and leathery, without visible side veins and with edges turned under; (2) small white flowers 3/16 inch across the 4 rounded petals, several in clusters at leaf bases; and (3) distinctive green seed capsules of 4 or fewer spreading oblong lobes 1/4 inch long, each splitting open on the upper side and 1-seeded.

Evergreen shrub or small tree to 35 feet high and 8 inches in trunk diameter, hairless. Roots yellow. Bark gray, smooth, the inner bark light pink and slightly bitter or almost tasteless. Twigs are blackish, becoming gray, often angled.

The leaves are opposite and alternate, with short green leafstalks 1/8–1/4 inch long, without stipules. Blades are 1–2 1/2 inches long, 1/2–1 inch wide, rounded at apex, broadest beyond middle, and gradually narrowed to long-pointed base, the upper surface dull green or slightly shiny, the lower surface dull light green.

Flower clusters (cymes) 1–2 inches long at leaf bases bear many small flowers on slender spreading stalks. The flowers have a short 4-lobed green calyx, 4 white rounded petals, 4 alternate stamens, and the pistil with 4-celled ovary partly within a disk and 4 tiny styles. The seed capsules with calyx at base are divided into 4 or fewer nearly separate lobes. The elliptic brown seeds 3/16 inch long are partly within a thin yellow covering (aril). Flowering irregularly through the year.

The wood is yellowish, hard, moderately heavy, and fine-textured.

Uncommon and local in upper Cordillera and upper Luquillo forests, including dwarf forest, at 2,500–4,390 feet altitude. Ridges and peaks mostly through central Puerto Rico up to the summit of Cerro de Punta, the highest peak.

PUBLIC FORESTS.—Guilarte, Luquillo, Toro Negro, Maricao (not found at Carite).

RANGE.—Cuba, Hispaniola (Dominican Republic), and Puerto Rico.

OTHER COMMON NAMES.—guairaje (Cuba); palo amarillo (Dominican Republic).

BOTANICAL SYNONYM.—*Torralbasia domingensis* Urban.

The generic name honors José Ildefonso Torralbas (1842–1903), Cuban botanist.

BLADDERNUT FAMILY (STAPHYLEACEAE)

Shrubs and trees, known by: (1) leaves generally opposite, odd pinnate, or with 3 leaflets, finely toothed, with paired stipules and rings at nodes; (2) small flowers in terminal clusters (panicles or racemes), white or greenish, generally bisexual, regular, with 5 sepals often persistent, 5 petals, 5 alternate stamens inserted around the large cuplike disk, and pistil with superior 3–2-celled ovary, many ovules, and 3–2 persistent styles; and (3) fruit a berry or inflated capsule with few seeds. Vol. 1, p. 300.

One species: 137. Sauco cimarrón, *Turpinia paniculata* Vent.

475. Boje *Torralbasia cuneifolia* (C. Wright) Krug & Urban

Natural size.

ICACINA FAMILY (ICACINACEAE)

Mostly small trees and shrubs, often woody vines (rarely herbs), known by: (1) leaves generally alternate, simple, usually entire, without stipules; (2) minute or small flowers, mostly in branched clusters (panicles), generally bisexual, regular, with minute calyx of 4–5 lobes, corolla of 4–5 petals sometimes united, 4–5 alternate stamens, and pistil with superior 1-celled ovary of 3–5 carpels and generally 2 ovules from apex, style, and mostly 3 stigmas; and (3) fruit usually a 1-seeded drupe.

Key to species

A. Leaves oblanceolate to oblong, 2½–6 inches long and 1¼–2 inches wide, rounded to short-pointed at apex, short-pointed at base—476. *Mappia racemosa.*

AA. Leaves elliptic to ovate, 2½–5 inches long and 1½–3 inches wide, blunt or rounded at apex, rounded at base—477. *Ottoschulzia rhodoxylon.*

476. ***Mappia racemosa* Jacq.**

This rare shrub or small tree has been found in Puerto Rico mainly only in the northwestern part. It is characterized by: (1) oblanceolate to oblong leaves 2½–6 inches long and 1¼–2 inches wide; (2) many greenish-yellow 5-parted flowers ¼ inch broad in branched clusters at leaf bases; and (3) elliptic fruits (drupes) ⅝–¾ inch long.

Evergreen shrub or small tree to 25 feet in height and 8 inches in trunk diameter. Bark dark gray, finely fissured into short plates. Twigs hairy when young.

Leaves alternate, with pressed hairs when young, with slender petioles ⅜–1 inch long. Blades are rounded to short-pointed at apex, short-pointed at base, not toothed on edges, thin, dark green on upper surface and light green beneath.

Flower clusters (panicles) are less than 2 inches long. Flowers many on very short stalks, male and bisexual (polygamous), composed of minute 5-toothed calyx; 5 oblong spreading yellow petals more than ⅛ inch long, hairy within; 5 stamens separate and alternate with petals; and on a disk the pistil with 1-celled ovary and short style (minute in male flowers). The fruits (drupes) contain 1 large stone and 1 seed. Flowering in spring and summer.

Rare in moist limestone forest near Quebradillas in northwestern Puerto Rico, reported long ago. Plants apparently of this species but without flowers or fruits have been found there in Guajataca Gorge at 200 feet altitude by one of the authors. Collected in flower in 1932 by N. L. and E. G. Britton at Asomate southwest of Manatí. Found near Fajardo in 1963 by Alain Liogier.

RANGE.—Jamaica, Cuba, Hispaniola, and Puerto Rico. Also Guatemala and Panama.

OTHER COMMON NAME.—palo de caña (Cuba).

76. *Mappia racemosa* Jacq.

Flowering twig (above), fruiting twig (below), natural size.

477. Palo de rosa ***Ottoschulzia rhodoxylon*** **(Urban) Urban**

This very rare tree has been found only in western Puerto Rico and Hispaniola and is poorly known, because flowers and fruits apparently have not been described. An evergreen small tree with slender hairless twigs with raised dots (lenticels) and minute, pointed, finely-hairy buds.

The alternate hairless leaves without stipules have petioles ¼–⅜ inch long. Blades are elliptic to ovate, 2–3½ inches long and 1¼–2½ inches wide, rounded or blunt at apex and base, not toothed on edges, thick and leathery, with 5–7 slender veins on each side of midrib, shiny on upper surface and paler beneath.

Flowers not described, apparently not collected. In this genus flowers are small, single or clustered at leaf bases, composed of 5 sepals united at base, corolla, with short cup-shaped tube and 5 lobes; 5 stamens near top of corolla tube and alternate with lobes, and pistil with 1-celled ovary, 2 ovules, and short style. The fruit in this genus is a small egg-shaped drupe, with 1 seed.

The wood is reported to be hard and heavy, the heartwood reddish (as indicated by the specific name and common name), and suitable for articles of turnery.

Incomplete material of this species was collected by Leopold Krug near Mayaguez in 1876 and was named in 1908. Additional specimens are desired.

RANGE.—Known only from western Puerto Rico and Hispaniola.

OTHER COMMON NAMES.—cuero de puerco, palomino (Dominican Republic).

This West Indian genus of 3 species was dedicated to Otto Eugen Schulz (1874–1936), German botanist, who studied plants of the West Indies.

477. Palo de rosa *Ottoschulzia rhodoxylon* (Urban) Urban

Natural size.

SOAPBERRY FAMILY (SAPINDACEAE)

Trees, shrubs, and woody vines with tendrils, rarely herbs, known by: (1) leaves alternate, generally pinnate, sometimes with 3 leaflets, without stipules (except in vines), the leaflets commonly alternate; (2) many minute flowers in branched clusters (panicles or cymes), mostly male and female or bisexual (polygamous or dioecious), regular or irregular, with 5 sepals, usually 5 petals often with scale or gland at base within, generally 10 or 8 stamens inserted within a disk, and pistil with superior ovary mostly 3-celled with 1–2 ovules in each cell, and style; and (3) fruit various, often large, 3-celled capsule, berry, drupe, or winged, the seed often with covering (aril). Fruits and seeds of a few species are edible, those of some are poisonous. Also vol. 1, p. 302.

Key to species

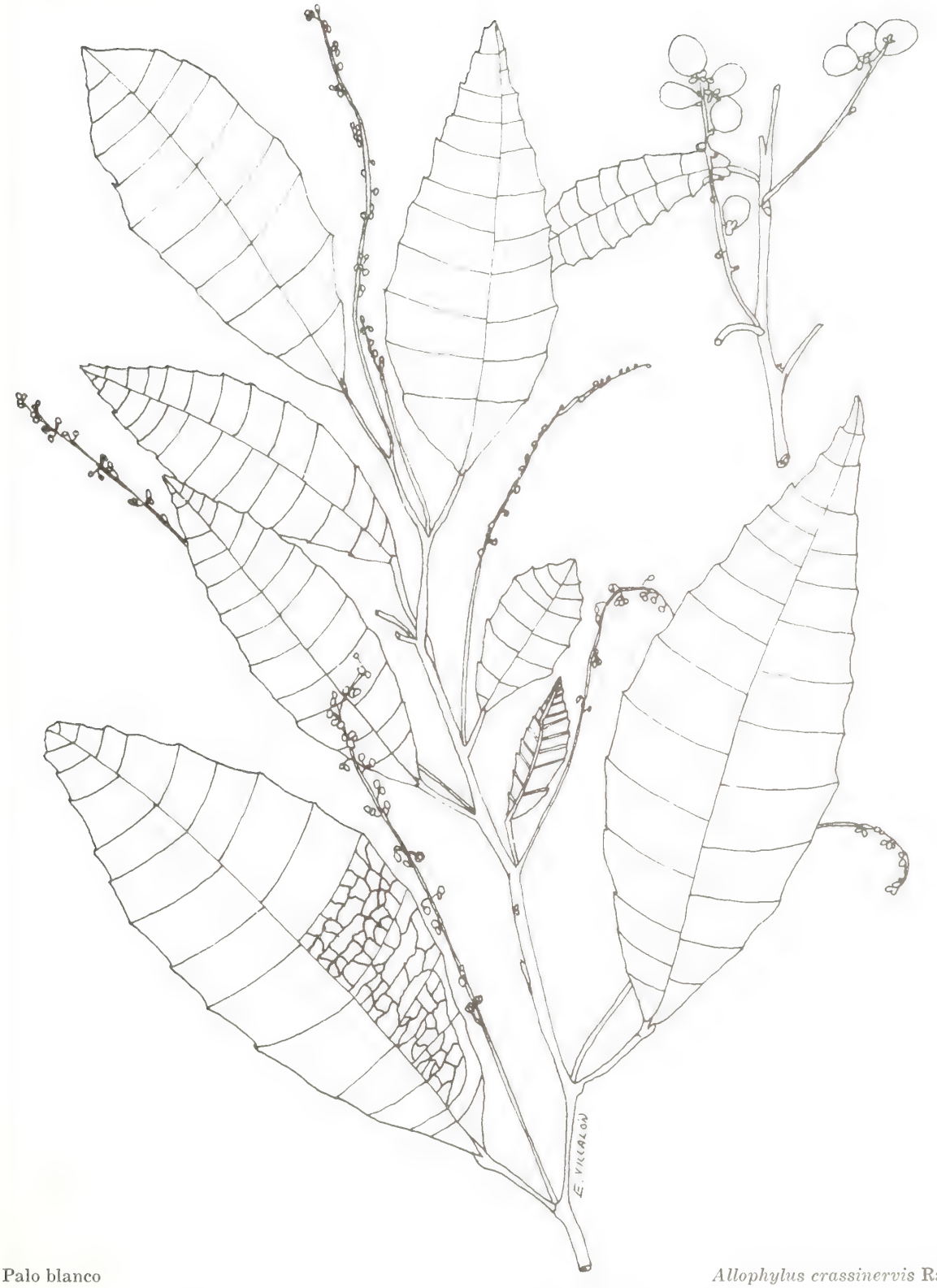
A. Leaves simple.
  B. Leaves oblanceolate, yellow green, sticky (viscid), slightly thickened, turned under at edges—482. *Dodonaea viscosa.*
  BB. Leaves elliptic, shiny green, thick and leathery, finely toothed at edges.
    C. Leaves long-pointed at apex, with prominent network of veins, nearly hairless—478. *Allophylus crassinervis.*
    CC. Leaves rounded at apex, beneath densely soft hairy with prominent veins—142. Serrasuela, *Thouinia portoricensis* Radlk.
AA. Leaves compound.
  D. Leaves with 3 leaflets, elliptic to oblanceolate or obovate, stalkless or nearly so.
    E. Leaflets ½–2 inches long, with many parallel fine side veins, blunt at apex, turned under at edges, hairless—484. *Hypelate trifoliata.*
    EE. Leaflets more than 2½ inches long, with fewer curved side veins, with toothed edges, hairy beneath.
      F. Leaflets short-pointed at apex, beneath soft hairy with prominent veins—143. Ceboruquillo, *Thouinia striata* Radlk.
      FF. Leaflets long-pointed at apex, beneath from very to slightly hairy—479. *Allophylus racemosus.*
  DD. Leaves pinnate with 4 or more leaflets (sometimes only 2).
    G. Leaflets 4–8, not paired, with wavy-toothed edges, elliptic, those toward end largest, rounded or notched at apex—*Cupania.*
      H. Leaflets yellow brown hairy beneath, edges with few teeth toward apex; seed capsules sharply 3-angled, with short yellow brown hairs—481. *Cupania triquetra.*
      HH. Leaflets gray hairy beneath, edges with teeth from base to apex; seed capsules bluntly 3-angled, with long velvety brown hairs—138. Guara, *Cupania americana* L.
    GG. Leaflets mostly paired, not toothed.
      I. Leaflets long- or short-ponted at both ends, on axis often winged; fruit round, fleshy.
        J. Leaflets 4, the pair at end larger; fruit ⅞–1¼ inches in diameter, edible (kinep)—140. Quenepa, kinep, Spanish-lime, *Melicoccus bijugatus* Jacq.*
        JJ. Leaflets usually 6–12, sometimes only 1 at end; fruit ⅝–1 inch in diameter, yellow, inedible—141. Jaboncillo, wingleaf soapberry, *Sapindus saponaria* L.
      II. Leaflets 2–10, mostly blunt or short-pointed at both ends, on axis not winged; fruit a capsule (except No. 483).
        K. Leaflets less than 4 inches long, hairless or nearly so.
          L. Leaflets 2, sometimes 4 or 6 (rarely 1 or 3), oblong to elliptic, 2–4 inches long, thin, hairless or nearly so; fruit round, fleshy—483. *Exothea paniculata.*
          LL. Leaflets 2–8, elliptic or lance-shaped, stiff and leathery, above shiny green with many raised side veins, beneath pale or brownish, on slender reddish or dark brown axis; fruit a flattened capsule—139. Negra lora, *Matayba domingensis* (DC.) Radlk.
        KK. Leaflets 6–10, mostly 3–8 inches long, elliptic, the lowest shortest, beneath with raised hairy side veins, on stout hairy axis; fruit a red fleshy 3-angled capsule (akee)—480. *Blighia sapida.**

478. Palo blanco — *Allophylus crassinervis* Radlk.

This shrub or small tree of mountain forests in western Puerto Rico is identified by: (1) lance-shaped leaves, thick, stiff, and leathery, with prominent network of veins, the parallel side veins mostly ending in minute teeth at edges; and (2) small rounded dry fruits ¼ inch long.

Evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter. Twigs slender, finely hairy when young.

Leaves alternate, simple (rarely with 3 leaflets as in related species), with slender hairy petioles ¼–½ inch or more in length. Blades are 2–3½ inches long and ¾–1¼ inches wide, long-pointed at apex, short-pointed or blunt at base, becoming hairless or nearly so, the upper surface shiny dark green, and the lower surface light green, with raised yellowish side veins nearly at right angle and many minute gland



78. Palo blanco *Allophylus crassinervis* Radlk.

Flowering twig (left), fruiting twig (upper right), natural size.

dots. The edges usually have short sharp teeth that point forward.

Flower clusters (racemes) have slender unbranched axis 1–2½ inches long from leaf base, bearing many whitish flowers less than ⅛ inch across on stalks of 1/16 inch. Flowers in this genus are mostly male and bisexual (polygamous), composed of 4 sepals, 4 white petals each with a 2-lobed scale, 8 stamens, and pistil with 2-lobed ovary, 2-celled 2-ovuled, and 2-lobed style. The dry fruit is short-stalked and hairless and contains 1 seed and does not split open. With flowers and fruits from spring to fall.

Locally common in moist limestone and Cordillera forests at 300–2,500 feet altitude in foothills of western Puerto Rico.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Puerto Rico, Hispaniola, and Cuba.

OTHER COMMON NAMES.—amansa potranca (Dominican Republic).

The descriptive specific name means thick veins.

479. Quiebrahacha ***Allophylus racemosus*** **Sw.**

This species of quiebrahacha is distinguished by: (1) the alternate leaves composed of 3 almost stalkless elliptic or oblanceolate leaflets with toothed edges; (2) the small greenish or whitish flowers about ⅛ inch long and broad along narrow unbranched lateral axes; and (3) the dry rounded brown, orange, or red fruits 5/16 inch in diameter.

Small deciduous tree to 30 feet high and 5 inches or more in trunk diameter, with few branches, or a shrub. The bark is gray and smooth or becoming slightly fissured into thin plates and peeling off. The inner bark is light brown and slightly bitter. The hairy twigs are gray green when young, turning light brown.

The leaves measure 5–10 inches long including the green, mostly long petioles of 1¼–6 inches. The 3 blades (trifoliolate) are 3–8 inches long and 1–2¼ inches wide, thin, the apex long-pointed and base short-pointed, the straight side veins ending in marginal teeth, the upper surface shiny green and the lower surface dull pale green and slightly to very hairy. The 2 side leaflets are slightly oblique at base.

The unbranched flower clusters (racemes) 1½–3 inches long bear many minutely hairy flowers on short stalks. The slightly irregular flowers are mostly male and female on different trees (dioecious). There are 2 small sepals and 2 larger, 4 small petals, 8 stamens on a disk, and in female flowers the pistil with 2-celled ovary. The fruits are slightly hairy and almost dry, do not open, and contain 1 rounded seed ¼ inch long. Collected with flowers in May-July and with fruits in June-August.

The light brown hard wood has served for fence posts.

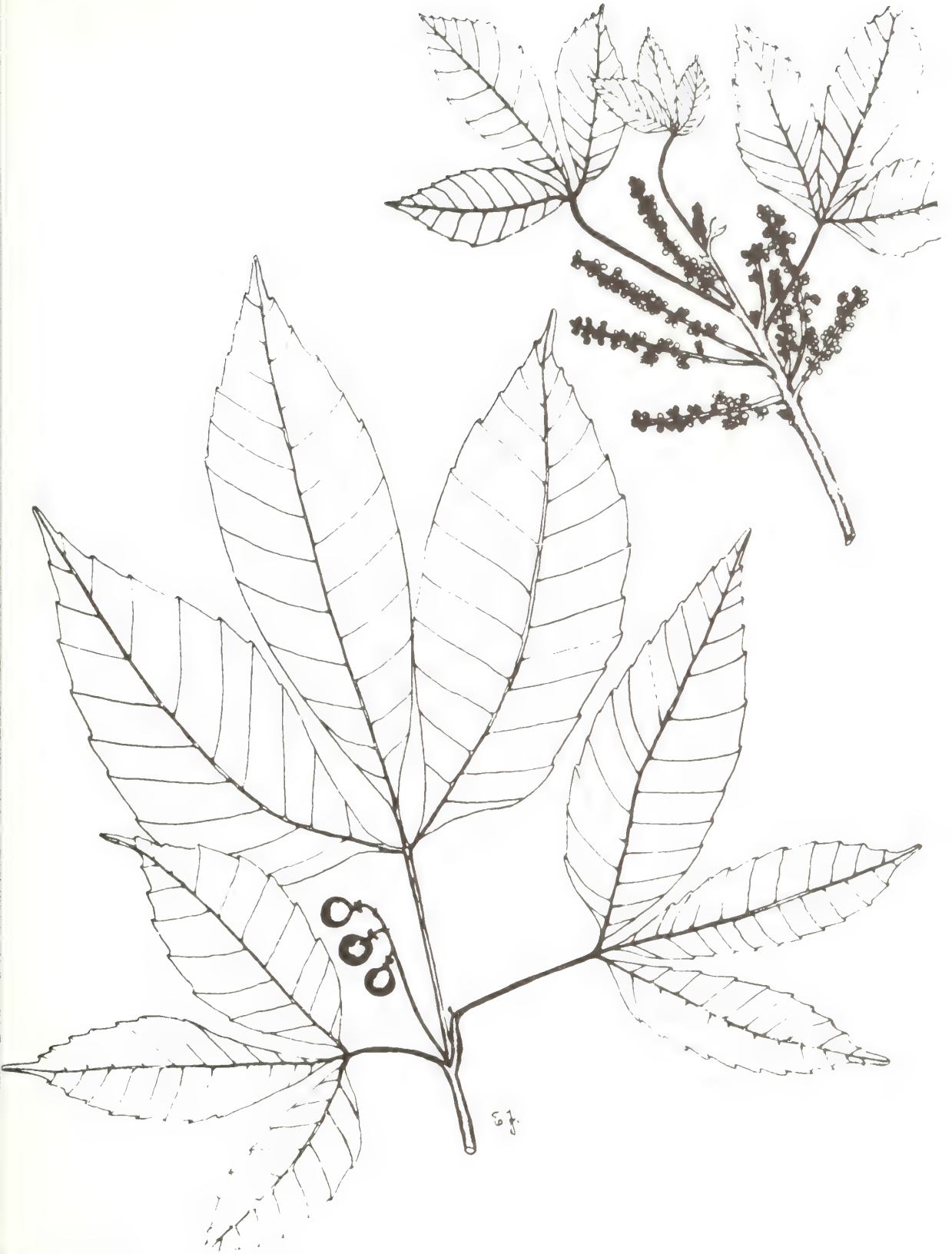
Rare to scattered in lowland forest, mostly in moist limestone forest at 500–1,000 feet altitude in western Puerto Rico. Also in St. Croix, St. Thomas and St. John.

PUBLIC FORESTS AND PARK.—Cambalache, Guajataca, Guánica, Luquillo, Río Abajo; Virgin Islands.

RANGE.—Cuba, Hispaniola, Puerto Rico and Virgin Islands, and from Saba to St. Vincent and Barbados. Also in continental tropical America from Guatemala to Colombia, Venezuela, and Guyana.

OTHER COMMON NAMES.—palo blanco (Puerto Rico); tres-palabras, palo de caja (Dominican Republic); palo de caja (Cuba); esuqitillo (Costa Rica); fruta paloma, marfil (Venezuela); café jaune, petit café, trois paroles (Haiti).

BOTANICAL SYNONYM.—*Allophylus occidentalis* (Sw.) Radlk.



79. Quiebrahacha *Allophylus racemosus* Sw.

Fruiting twig (left), flowering twig (upper right), two-thirds natural size.

480. Seso vegetal, akee ***Blighia sapida* Koenig***

Akee or vegetable brains is sometimes planted for the whitish seed covering, which is edible when picked fresh and cooked properly but otherwise a deadly poison. This dangerous tree is not common but should be learned and should not be planted wherever children play. Distinguishing characters are: (1) alternate even pinnate leaves with 3–5 pairs of large elliptic yellow-green leaflets; (2) many whitish flowers about 3/8 inch wide in long narrow clusters at leaf bases; and (3) fruit a showy drooping red fleshy capsule 2–3 inches long, 3-angled and 3-celled.

Small evergreen tree 30 feet high and 1 foot in trunk diameter. Bark gray, smoothish to slightly rough. Inner bark pinkish, gritty and slightly bitter. Twigs are light gray, stout, finely hairy, with many long narrow ridges, ending in a bud of minute hairy leaves pressed together.

Leaves alternate, mostly 9–15 inches long, with stout light green hairy axis 5–8 inches long. Leaflets 3–5 pairs, with short stalks about 1/4 inch long. The blades are elliptic, mostly 3–8 inches long and 1 1/2–4 inches wide, the lowest shorter, short-pointed at both ends, slightly stiff and thickened, slightly bent up at midrib and turned under at edges. The upper surface is shiny yellow green and hairless, with many sunken, parallel side veins, the lower surface dull light green with raised hairy side veins.

Flower clusters (racemes) are unbranched, 3–7 inches long, with flowers on stalks 1/4–3/4 inch long. Flowers of 2 kinds, partly bisexual and partly male, finely hairy, fragrant. The calyx consists of 5 pointed brownish-tinged sepals 1/8 inch long; petals 5, white, 3/16 inch long, narrow with lobe at base; 8 stamens 1/4 inch long on a disk; and pistil with 3-angled 3-celled 3-ovuled brownish ovary, slender style and dot stigma.

The fleshy heavy capsules have calyx at base and style at apex and are densely hairy on inner walls. There are 3 shiny dark brown round seeds 3/4 inch in diameter, each with a large white fleshy cover (aril) around the base and attached to the fruit by a red or pink membrane, which is poisonous. Flowering and fruiting irregularly.

The "akee," from the native African name, is the edible part. This soft white or cream-colored cover around each seed must be used fresh, that is, when firm and pulled away from the capsule without bringing also the red, pink, or orange membrane which is bright in color when fresh. This membrane is poisonous and must be carefully removed before cooking. Preparation is by parboiling in water with salt, and afterwards stewing or frying with butter, or by boiling in soups. The appearance and the taste when fried suggest that of brains, hence the Spanish name seso vegetal (vegetable brains). Unfortunately, if not fresh or if picked from a broken branch, the "akee" is toxic and causes death. Damaged, unripe, or fallen fruits should never be eaten. Children have been killed by eating the raw fruits. Others have died from eating improperly picked or prepared fruits. Thus akee is one of the most toxic and most dangerous trees.

The hard wood has been used elsewhere for lumber.

Akee is rarely planted in Puerto Rico, having been introduced about 1904, and also the Virgin Islands but found only in cultivation. The showy fruits and yellow-green foliage make it a handsome ornamental also. However, planting of akee is not recommended because of the risk of killing children and others unfamiliar with it. Trees around houses probably should be destroyed. In Jamaica akee is more widely grown and has become naturalized. Cultivated through the tropics north to southern Florida but not common.

RANGE.—Native of western tropical Africa (Guinea).

OTHER COMMON NAMES.—akee, akee-tree, vegetable brains (English); seso vegetal (Spanish); akee de Africa (Cuba); huevo vegetal (Panama, Colombia); bien me sabe, pan y quesito (Colombia); aki, arbre fricassé (French); akee (Dutch Antilles); castanheiro do Africa (Brazil).

The generic name honors Captain William Bligh (1754–1817), British mariner, who introduced this tree to Jamaica from Africa. He brought breadfruit plants from Tahiti of the South Sea Islands to Jamaica and St. Vincent in the British ship "Providence" in 1793. The mutiny of the "Bounty" against him caused failure of an earlier attempt in 1789.

480. Seso vegetal, akee *Blighia sapida* Koenig*

Leafy twig (above), flowers (left), fruits (below), two-thirds natural size.

481. Guara blanca ***Cupania triquetra* A. Rich.**

This species of guara is identified by: (1) minute yellow-brown hairs on twigs, petioles, lower leaf surfaces, branches of flower clusters, flowers, and fruits; (2) pinnate leaves with 4–8 alternate elliptic or obovate leaflets, those toward apex largest, the edges with a few wavy teeth toward apex; (3) many small whitish 5-parted flowers 1/8 inch across in terminal branched clusters; and (4) the many 3-angled seed capsules 3/4 inch long and broad, splitting into 3 parts and exposing 3 rounded shiny blackish or brownish seeds 5/16 inch long, each in an orange cup. From the more common related species No. 138, guara, *Cupania americana* L., this species differs in the shorter yellow-brown hairs, in the leaf edges with fewer teeth, and in the capsules sharply 3-angled and longer stalked.

A medium-sized evergreen tree to 65 feet high with buttressed trunk to 1 foot in diameter. The bark is gray and smooth. Twigs are stout and covered with minute yellow-brown hairs.

The alternate pinnate leaves are 5–12 inches long, with stout hairy axes. Leaflets have short hairy stalks 1/8–1/4 inch long. The blades are 2–5 inches long and 1–3 inches wide, sometimes larger, slightly thickened, rounded or notched at apex, short-pointed at base, the upper surface becoming hairless, and the lower surface soft hairy with raised veins.

Flower clusters (panicles) are 4–8 inches long, with many yellow hairy branches. The flowers (not seen) in this genus are male, female, and bisexual (polygamous), composed of 5 hairy sepals, 5 hairy petals each with 2 scales on outer edges, 8 stamens on a disk, and pistil with hairy 3-celled ovary, short style, and 3 stigmas. The seed capsules develop a short stalk 1/16 inch long above the persistent sepals. Recorded with flowers from October to March and with fruits from March to June.

Rare to scattered in moist limestone forest at 300–1,000 feet altitude in Puerto Rico. Also Vieques, St. Thomas, and St. John.

PUBLIC FORESTS.—Luquillo, Río Abajo.

RANGE.—Hispaniola (very rare), Puerto Rico, St. Thomas, St. John, Guadeloupe, and Martinique.

OTHER COMMON NAME.—guara (Puerto Rico).

The specific name, meaning 3-angled, describes the seed capsules.

481. Guara blanca *Cupania triquetra* A. Rich.

Flowers (left), leaf (above), fruits (lower right), two-thirds natural size.

482. Gitarán, hopbush ***Dodonaea viscosa*** **(L.) Jacq.**

This shrub of coastal thickets becomes a small tree at Anegada. It is identified by: (1) the sticky (viscid) foliage and flowers; (2) yellow-green oblanceolate leaves 1–4 inches long and ⅜–1¼ inches wide; (3) small greenish yellow flowers ¼ inch across, in branched clusters; and (4) the many crowded distinctive light brown seed capsules ½–1 inch in diameter, rounded, with 3 or 2 papery wings.

Evergreen shrub to 12 feet high, on Anegada Island becoming a small tree 15 feet high and 4 inches in trunk diameter. The bark is gray, fissured and fibrous. The twigs are slender, gray, and hairless.

The alternate sticky nearly hairless leaves are narrowed into a short petiole less than ¼ inch long. The blades are blunt, rounded, notched, or with minute point at apex, slightly thickened and turned under at edges.

Flower clusters (panicles) are about 1 inch long at ends and sides of twigs. The short-stalked sticky flowers are partly male, female, and bisexual on the same plant (polygamous) or different plants. There are usually 4 hairy sepals less than ⅛ inch long, no corolla, 5–8 stamens, and pistil with 3-angled ovary, slender style, and 3 stigmas. The seed capsules are notched at both ends, with 3 or 2 cells and rounded papery wings. Seeds 3–1, round, black, ⅛ inch in diameter. Flowering irregularly through the year, fruits nearly always present.

The hard wood has light brown sapwood and dark brown heartwood.

Sometimes grown in fence rows and hedges. Elsewhere used in home remedies and the fruits as fish poison.

Locally common on coastal sandy areas, in strand vegetation of dry areas, forming thickets at sea level. Northern coast of Puerto Rico, also Mona and Anegada, and recorded from St. Croix and St. Thomas. Forming a forest in Anegada.

RANGE.—This species including varieties is widely distributed through the tropics including Bermuda, West Indies, continental tropical America from southern Florida, southern Arizona, and Mexico southward, and Old World.

OTHER COMMON NAMES.—chamiso, guitarán, castaño (Puerto Rico); chamiso (Spanish); palo de reina, palo de rey, granadillo (Dominican Republic); chulita (El Salvador); hayuelo, chanamo (Colombia); hopbush (United States); pichon (Trinidad); hopshrub (Barbados) switch-sorrel (Jamaica); dogwood (Bahamas); pativier (Haiti); bois guillaume (Désirade).

Two variations are present. The typical variety has large thin leaves and large fruits. That on Mona and Anegada has smaller and thicker leaves less than 2 inches long and smaller fruits about ½ inch in diameter (var. *arborescens* (Hook. f.) Sherff; *D. ehrenbergii* Schlecht.).

482. Gitarán, hopbush *Dodonaea viscosa* (L.) Jacq.

Fruiting twig, natural size.

483. Gaita, butterbough ***Exothea paniculata*** **(Juss.) Radlk.**

Gaita is recognized by: (1) even pinnate leaves with 2, sometimes 4 or 6 (rarely 1 or 3) paired oblong to elliptic yellow-green leaflets; (2) small 5-parted whitish flowers more than ¼ inch across, in branched clusters; and (3) dark red, purplish, or black round fleshy fruits ⅜–½ inch in diameter, 1-seeded, several in grapelike clusters.

Evergreen small to medium-sized tree 50 feet high and 10 inches in trunk diameter, reported to reach 65 feet and 20 inches. The bark is brown or reddish brown, smoothish with large thin flakes or scales. Inner bark is reddish brown and bitter. The slender twigs are covered with minute yellowish hairs when young, becoming gray with raised dots (lenticels).

The alternate leaves have short slender petioles ¾–½ inch or more in length. Leaflet blades are 2–4 inches long and ⅝–1½ inches wide, blunt, short-pointed, or sometimes notched at apex, short-pointed and nearly stalkless at base, the edges straight or slightly wavy, thin, hairless or nearly so. The upper surface is yellow green and slightly shiny, the lower surface paler.

Flower clusters (panicles) at ends and sides of twigs are 3–6 inches long, with slender yellowish hairy branches. The many fragrant flowers are partly male, female, and bisexual on the same or different trees (polygamo-dioecious), composed of 5 hairy sepals ⅛ inch long, persistent and becoming turned back; 5 whitish or cream-colored petals about as long as sepals; 8 stamens inserted on the disk; and pistil with 2-celled ovary, short curved style, and dot stigma.

The berrylike fruits (drupes) have calyx at base, pointed style at apex, thin orange juicy pulp, and 1 large round brown seed 5/16 inch in diameter. Collected with flowers from November to March and with fruits in March and June.

The sapwood is whitish or light brown and the heartwood reddish brown. The hard heavy fine-textured wood takes a fine polish. It has been used in cabinetwork, for tool handles, and elsewhere for posts, railroad crossties, marine piling, and boatbuilding.

Rare in dry and moist limestone forests at 100–1,500 feet altitude in north coast and foothills of Cordillera of western Puerto Rico. Also in Mona and Vieques.

PUBLIC FORESTS.—Cambalache, Guajataca, Guánica, Río Abajo, Vega.

RANGE.—Southern Florida, Bahamas, Greater Antilles, and St. Eustatius, Désirade, and St. Vincent. Also Mexico and Guatemala.

OTHER COMMON NAMES.—guacarán (Puerto Rico); cuerno de buey, nisperillo (Dominican Republic); yaicuaje, guamacá (Cuba); butterbough, inkwood, ironwood (United States); wild ginep (Jamaica); butterbough (Bahamas); bois mûlet, guénépier marron (Haiti).

483. Gaita, butterbough *Exothea paniculata* (Juss.) Radlk.

Flowering twig (left), fruiting twig (lower right), natural size.

484. Melocha, inkwood ***Hypelate trifoliata* Sw.**

A rare small tree of dry areas, recognized by: (1) the distinctive small leaves with 3 stalkless obovate to oblanceolate leaflets slightly shiny and stiff, with many fine parallel side veins; (2) small whitish 5-parted flowers ¼ inch across, in spreading branched clusters near ends of twigs; and (3) black egg-shaped fleshy fruits (drupes) ¼ inch long.

Evergreen small tree or shrub to 20 feet in height and 4 inches in trunk diameter. The bark is gray and smooth. Twigs are slender and gray.

The alternate hairless leaves 1½–3 inches long have slender greenish petioles ½–1¼ inches long. Leaflet blades are ½–2 inches long and 3/16–½ inch wide, blunt or sometimes notched at apex, broadest beyond middle, narrowed toward the long-pointed base, stiff, turned under at edges, green above and yellow green beneath.

Flower clusters (panicles) at leaf bases are 1–3 inches long. The flowers are male and female on the same plant (monoecious), sometimes bisexual, whitish, turning pinkish. There are 5 spreading elliptic sepals ⅛ inch long; 5 shorter rounded petals; 8 stamens ⅛ inch long inserted on the disk, short and sterile in female flower; and pistil with 3-celled ovary with 2 ovules in each cell, short curved style, and dot stigma. The fruits have thin flesh reportedly sweetish and 1 large seed. Collected with flowers from winter and summer and with fruits in summer.

The wood is described as dark brown, heavy, hard and durable. It is used for fence posts and tool handles and elsewhere for railroad crossties and shipbuilding.

Rare in dry limestone forest from sea level to 700 feet altitude in southwestern Puerto Rico. Also Mona and Icacos.

PUBLIC FOREST.—Guánica.

RANGE.—Southern Florida, Bahamas, Cayman, Greater Antilles, Mona, Icacos, St. Martin, and Anguilla.

OTHER COMMON NAMES.—granadillo (Dominican Republic); hueso de costa, cuaba de ingenio, vera, raspadura (Cuba); inkwood, white-ironwood (United States); white-ironwood (Bahamas); chandelle marron, gallipeau (Haiti).

Excluded species: *Matayba apetala* (Macf.) Radlk. (*M. oppositifolia* (A. Rich.) Britton). The single old collection from Utuado so labeled lacks flowers and fruits and agrees with another of No. 139, negra lora, *M. domingensis* (DC.) Radlk., from the same locality by the same collector. The excluded species, known as macurije in Cuba and coby-wood in Jamaica, is distinguished by 4–10 elliptic-lanceolate to oblong leaflets long-pointed at both ends. RANGE.—Hispaniola, Cuba, Jamaica, and Central America.

484. Melocha, inkwood *Hypelate trifoliata* Sw.

Fruiting twig (left), flowering twig (upper right), natural size.

SABIA FAMILY (SABIACEAE)

Trees, shrubs, and woody vines, known by: (1) leaves alternate, generally simple, sometimes odd pinnate, with enlargement at base of petiole, without stipules; (2) minute flowers, usually many in branched clusters (panicles), commonly bisexual, slightly irregular, calyx of 3–5 sepals or lobes and persistent, 4–5 unequal petals (2 very reduced), small disk, 3–5 opposite stamens inserted at base of petals or separate, and pistil with superior ovary of 2–3 cells with 2 ovules and 1 or 2 styles; and (3) fruit a rounded drupe or berry or dry, 1-seeded. Also vol. 1, p. 314.

Key to species

A. Leaves obovate, rounded at apex, mostly 2½–5 inches long; fruits about ⅜ inch in diameter—485. *Meliosma obtusifolia.*

AA. Leaves elliptic, short-pointed or blunt at apex, mostly 3–8 inches or more in length; fruits ⅝–¾ inch long—144. Aguacatillo, *Meliosma herbertii* Rolfe.

485. Arroyo — *Meliosma obtusifolia* (Bello) Krug & Urban

This rare species found only in mountain forests of Puerto Rico is characterized by: (1) obovate thick leaves rounded at apex, mostly 2½–5 inches long and 1¼–2½ inches wide, sometimes larger, with edges turned under, 1, 2, or sometimes 3 at a node; (2) many small whitish flowers about ⅛ inch across, crowded and stalkless in branched clusters; and (3) round fruits (drupes) more than ⅜ inch in diameter, whitish, turning dark brown or black, clustered like grapes.

Medium-sized evergreen tree to 65 feet high and more than 1 foot in trunk diameter. The bark is light brown, becoming fissured, the inner bark pink, turning red brown on exposure, slightly bitter. Twigs are slender, brown, with fine rusty-brown hairs when young.

The leaves are crowded near ends of twigs, alternate, opposite, and whorled, hairless, with petioles ⅜–¾ inch long, recorded to 8 inches long and 3 inches wide with petioles to 1¼ inches. Blades are thick and leathery, gradually narrowed to base, with midvein slightly sunken, the upper surface shiny green with raised veins, and the lower surface dull light green.

Flower clusters (panicles) are large and branched, 2½–5 inches or more in length, at ends of twigs and leaf bases, often longer than leaves. The many stalkless flowers from greenish buds are composed of 5 rounded overlapping sepals less than 1/16 inch long with hairy border, remaining at base of fruit; 5 whitish petals, the outer 3 nearly ⅛ inch long and 2 small narrow scales; 2 stamens opposite the small petals and 3 sterile (staminodes); and pistil with ovary, style, and 2 minute stigmas. The many fruits pale green when immature are hard and dry, containing 1 seed within the large stone. With flowers and fruits through the year.

The wood is whitish and hard.

Rare in upper Cordillera forest at 1,800–3,000 feet altitude in mountains of western Puerto Rico. Collected long ago in Luquillo Mountains.

PUBLIC FORESTS.—Guilarte, Luquillo, Maricao.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAMES.—cacaillo, cacao bobo, ciralillo, cerrillo, guayarote (Puerto Rico).

485. Arroyo *Meliosma obtusifolia* (Bello) Krug & Urban

Flowering twig (above), fruiting twig (lower left), natural size.

BUCKTHORN FAMILY (RHAMNACEAE)

Shrubs, woody vines, and small to large trees, rarely herbs, often spiny, known by: (1) leaves mostly alternate, also opposite, simple, often with 3 or more veins from base (palmate-veined), usually with minute stipules; (2) small greenish or yellowish flowers, mostly in lateral clusters (cymes), usually bisexual, regular, with concave cuplike base (hypanthium), with 5–4 sepals touching by edges in bud, 5–4 small petals (or none) concave and very narrow with narrow base, 5–4 opposite stamens enclosed by petals, and pistil with superior ovary within the disk (sometimes surrounded by disk and appearing inferior) with 2–4 cells of 1 ovule, style, and 1–5 stigmas; and (3) fruit a berry, drupe, or capsule, often opening in 3 parts. Also vol. 1, p. 316.

Key to species

A. Leaves with 3 main veins from base; twigs with paired or single spines—*Ziziphus.*
  B. Leaves hairless, often rolled under at edges; twigs hairless—491. *Ziziphus rignonii.*
  BB. Leaves soft hairy on lower leaf surfaces, finely toothed on edges; twigs hairy.
    C. Leaves with prominent network of raised veins on lower surface; twigs rusty hairy; fruits ⅜–⅝ inch long—148. Cascarroya, *Ziziphus reticulata* (Vahl) DC. (*Sarcomphalus reticulatus*).
    CC. Leaves densely whitish hairy beneath; twigs whitish or rusty hairy, fruits ¾–1 inch long—490. *Ziziphus mauritiana.**
AA. Leaves with 1 main vein, edges not toothed; twigs not spiny (except No. 492).
  D. Leaves opposite.
    E. Leaves only slightly thickened, elliptic, notched at rounded apex—147. Bariaco, "ironwood," leadwood, *Krugiodendron ferreum* (Vahl) Urban.
    EE. Leaves thick and leathery—*Reynosia.*
      F. Leaves less than 1 inch long, ending in minute sharp hooked spine beneath apex—488. *Reynosia uncinata.*
      FF. Leaves more than 1½ inch long, the broad apex ending in minute point.
        G. Leaves broadly elliptic, slightly notched at apex—486. *Reynosia guama.*
        GG. Leaves ovate, blunt at apex—487. *Reynosia krugii.*
  DD. Leaves alternate.
    H. Leaves ½–1 inch long, obovate to rounded, notched at apex; twigs sometimes with small spines—492. *Ziziphus taylorii.*
    HH. Leaves more than 1 inch long, elliptic, pointed at apex.
      I. Leaves long-pointed at apex, with short straight side veins and wavy teeth at edges—489. *Rhamnus sphaerosperma.*
      II. Leaves mostly short-pointed at apex, the side veins curved and prolonged near edges—*Colubrina.*
        J. Leaves slightly thickened, the lower surface, petioles, and twigs with rusty brown hairs, especially when young—145. Abeyuelo, coffee colubrina, *Colubrina arborescens* (Mill.) Sarg.
        JJ. Leaves thin, the lower surface pale green and minutely hairy—146. Mabí, soldierwood, *Colubrina elliptica* (Sw.) Briz. & Stern (*C. reclinata*).

486. Guamá — *Reynosia guama* Urban

This small tree is recognized by: (1) the paired broadly elliptic leaves 1½–3 inches long and 1¼–2 inches wide, slightly notched with a minute point at apex, rounded or slightly notched at base, thick and leathery with midrib much sunken; (2) several small yellow-green flowers ⅛ inch long, clustered on short slender stalks at bases of leaves; and (3) elliptic fruits ⅜ inch long with cup of calyx at base and 1 large seed.

Shrub or small tree often wandlike to 20 feet high and 3 inches in trunk diameter, hairless throughout. The bark is light gray and smooth. The twigs are light brown, slender, and hairless or nearly so, becoming scaly, and end in minute brown bud formed by pointed stipules.

The opposite leaves have 2 minute pointed stipules 1/16 inch long and short petioles less than ¼ inch long. The blades are shiny dark green above and dull light green beneath, with sunken midvein, few curved lateral veins, and border slightly curved under.

Flowers several clustered (sometimes only 1) at leaf bases on stalks of ⅛–¼ inch, consisting of cuplike base (hypanthium), 5 pointed sepals 1/16 inch long, 5 narrow petals 1/16 inch long, 5 opposite stamens, and pistil. The fruits (drupes) are borne on short stalks at leaf bases, greenish when immature, with greenish cup of calyx at base and pointed style at apex. Inside the thin pulp is the large elliptic seed. Flowering from spring to fall.

486. Guamá *Reynosia guama* Urban

Flowering twig (above) fruiting twig (lower right), natural size.

In St. John an alcoholic drink called warmerberry wine or guamaberry wine is prepared from the mature fruits and rum, aged and seasoned.

Rare in thickets on dry coastal hills and dry limestone forest at 100–300 feet altitude in southwestern Puerto Rico. Also in St. Thomas, St. John, Jost Van Dyke, and Virgin Gorda.

PUBLIC FORESTS AND PARK.—Guánica; Virgin Islands.

RANGE.—Known only from Puerto Rico and the Virgin Islands.

This rare species was known only from the Virgin Islands until found also in southwestern Puerto Rico by foresters in 1940.

487. ***Reynosia krugii* Urban**

Characteristics of this small tree are: (1) opposite ovate leaves 2–3½ inches long and 1–2 inches wide, slightly thick and leathery, the apex blunt with a minute point; (2) minute whitish flowers less than ⅛ inch broad, few leaf bases; and (3) blackish elliptic fruit ⅝–¾ inch long, with large stone.

Evergreen small tree 20 feet high and 3 inches in trunk diameter, recorded to 30 feet. Bark gray, slightly furrowed, the inner bark reddish brown, bitter. Twigs are brown, finely fissured, minutely hairy when young.

The opposite hairless leaves have slender curved leafstalks ¼ inch long. The paired stipules 4 to a node are narrow pointed scales 1/16 inch long, forming the bud. Blades are rounded at base, slightly turned under at edges, the upper surface dull or slightly shiny green with sunken midvein and side veins inconspicuous, the lower surface paler.

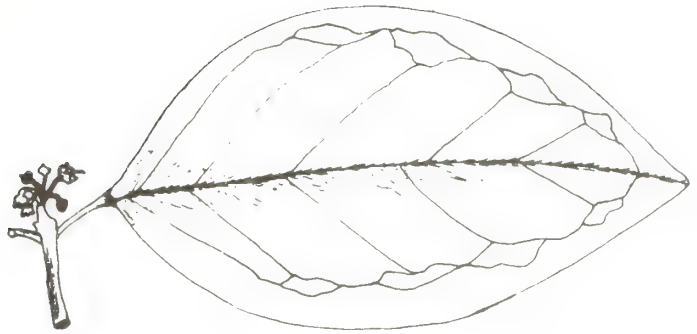
Flowers are short-stalked, minute, with cup-like base, 4 pointed sepals, 4 small petals, 4 opposite stamens, and within disk the pistil with rounded ovary and short style. The fruit (drupe) has thin dark red juicy flesh and large stone. Flowering and fruiting irregularly.

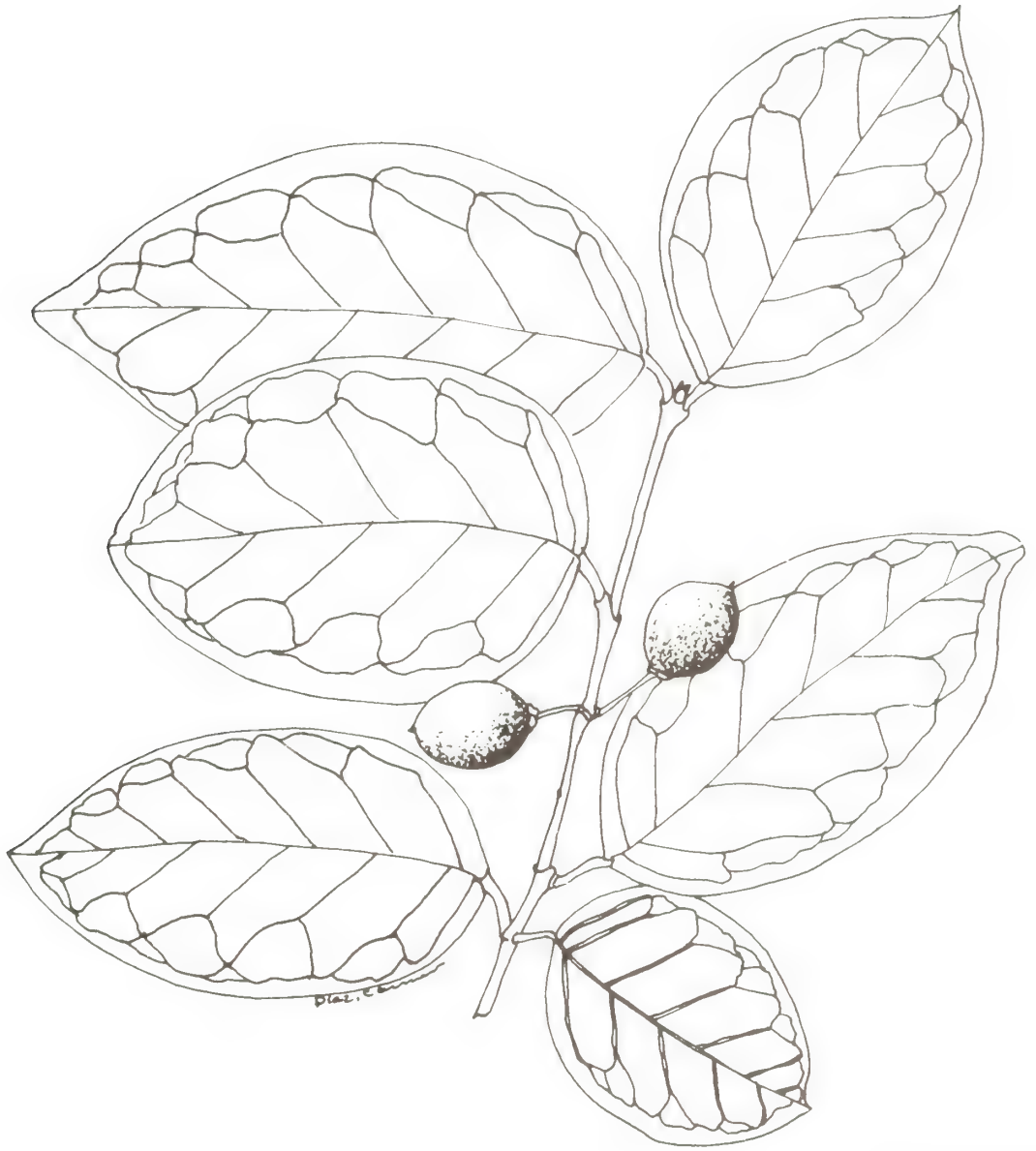
Wood light brown, hard.

Rare in moist limestone, lower and upper Cordillera forests and coastal hills at 200–3,000 feet altitude in Puerto Rico. Widely distributed from Fajardo and Cayey to northwestern mountains.

PUBLIC FORESTS.—Cambalache, Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Known only from Puerto Rico.





487. *Reynosia krugii* Urban

Flowering twig (above), fruiting twig (below), natural size.

488. Cascarrolla ***Reynosia uncinata*** **Urban**

Cascarrolla is easily recognized by the odd small stiff elliptic to oblong paired leaves that end in a minute sharp hooked spine hidden beneath the apex. This shrub, sometimes a small tree, of dry areas is further identified by: (1) minute yellow-green flowers $\frac{1}{8}$ inch long and broad, few clustered at leaf bases; and (2) round blackish fleshy fruits $\frac{1}{2}$–$\frac{5}{8}$ inch long.

Evergreen shrub or small tree to 30 feet high and 5 inches in trunk diameter. Bark dark gray, smoothish, with shallow fissures or large scales. The inner bark is reddish brown with narrow lighter streaks, slightly bitter. The twigs, mostly paired, short and branched, are gray, minutely hairy when young, becoming fissured.

The leaves are opposite and mostly crowded on short twigs. Paired stipules 4 to a node are narrow pointed scales $\frac{1}{16}$ inch long which form the bud. The slender light green petioles are $\frac{1}{16}$ inch long. The blades are $\frac{3}{8}$–1 inch long and $\frac{1}{4}$–$\frac{5}{8}$ inch wide, stiff and slightly thick, hairless, rounded at base, slightly curved down at edges, the upper surface shiny green, the lower surface dull light green, the side veins inconspicuous. The sunken midvein continues beyond the notched apex into a minute sharp hooked spine less than $\frac{1}{16}$ inch long and hidden beneath.

The flowers on a short stalk of $\frac{1}{8}$–$\frac{1}{4}$ inch are composed of a short cuplike base (hypanthium), 5 pointed sepals, 5 smaller narrow petals, 5 opposite stamens, and within disk the pistil with rounded ovary and short style. The fruit (drupe) has thin dark red juicy flesh, reported to be edible, and large stone. Flowering irregularly through the year.

The wood is light brown and hard.

Locally common in dry coastal and limestone forests from sea level to 400 feet in southwestern Puerto Rico. Also Mona, St. Croix, Tortola, and Anegada.

PUBLIC FORESTS.—Guánica.

RANGE.—Cuba, Hispaniola, Puerto Rico and Virgin Islands, and Anguilla.

OTHER COMMON NAMES.—chicharrón (Puerto Rico); cascahueso (Dominican Republic); sloe (Anguilla); brillol, galle-galle (Haiti).

The specific name, meaning hooked, refers to the hidden spine beneath leaf apex.

488. Cascarrolla *Reynosia uncinata* Urban

Fruiting twig (upper left), flowering twig (right), natural size.

489. West Indian buckthorn ***Rhamnus sphaerosperma*** **Sw.**

This shrub of mountain forests, sometimes becoming a small tree, is distinguished by: (1) elliptic leaves with wavy teeth at edges and ending in a long point; (2) small yellow-green cup-shaped flowers 1/8 inch long and broad, the calyx with 5 long-pointed sepals; and (3) fruit rounded, about 1/4 inch in diameter, with cuplike base, 3-seeded.

Evergreen shrub, sometimes a small tree 20 feet high and 3 inches in trunk diameter. The slender twigs are green and with scattered reddish-brown hairs when young, becoming gray, with raised dot lenticels.

The alternate leaves have slender hairy leafstalks 1/4–3/4 inch long. Blades are mostly 1 1/2–3 inches long and 3/4–1 1/2 inches wide (recorded to 6 1/2 inches by 2 7/8 inches), short-pointed at base, thin, upper surface shiny green to dark green and hairless, the lower surface slightly shiny light green and hairy on veins.

Flowers few on slender stalks about 1/4 inch long at leaf bases. The short cuplike yellow-green hairy base (hypanthium) bears 5 spreading pointed yellow-green sepals 1/16 inch long, 5 smaller narrow notched whitish petals folded around the 5 tiny opposite stamens. The pistil has a 3-celled ovary, short style, and 3-lobed stigma. Fruits (drupes), with cuplike base and dotlike style at apex, are green when immature, slightly fleshy. Flowering intermittently, noted with flowers from January to July and with fruits from May to July.

Rare in upper Luquillo and upper Cordillera forests and dwarf forest at 2,500–4,000 feet altitude in mountains of Puerto Rico. Near summit of Cerro de Punta at about 4,000 feet.

PUBLIC FORESTS.—Luquillo, Maricao, Toro Negro.

RANGE.—Greater Antilles.

OTHER COMMON NAME.—West Indian buckthorn (English).

489. West Indian buckthorn *Rhamnus sphaerosperma* Sw.

Flowering twig (above), fruiting twig (below), natural size.

490. Aprín, India jujube ***Ziziphus mauritiana* Lam.***

This tree introduced for its edible fruits is recognized by: (1) the dense whitish or rusty-brown hairs on twigs, petioles, lower leaf surfaces, and flower clusters; (2) broadly elliptic leaves rounded at both ends, finely-toothed on edges, densely whitish hairy beneath, with 3 main veins from base, and with paired spines (stipules) often present at base; (3) many small yellow 5-parted hairy flowers 3/16 inch across, clustered at leaf bases; and (4) the edible, fleshy and nearly elliptic or rounded orange-red fruits 3/4–1 inch long.

A small evergreen fruit tree to 40 feet high and 1 foot in trunk diameter. The slender twigs are finely hairy, often with paired straight or curved sharp brown spines 1/8–1/4 inch long at nodes.

The leaves alternate in 2 rows have hairy petioles 1/4–3/8 inch long. Blades are 1 1/2–2 1/2 inches long and 1–1 3/4 inches wide, shiny green and hairless above and densely whitish soft hairy beneath.

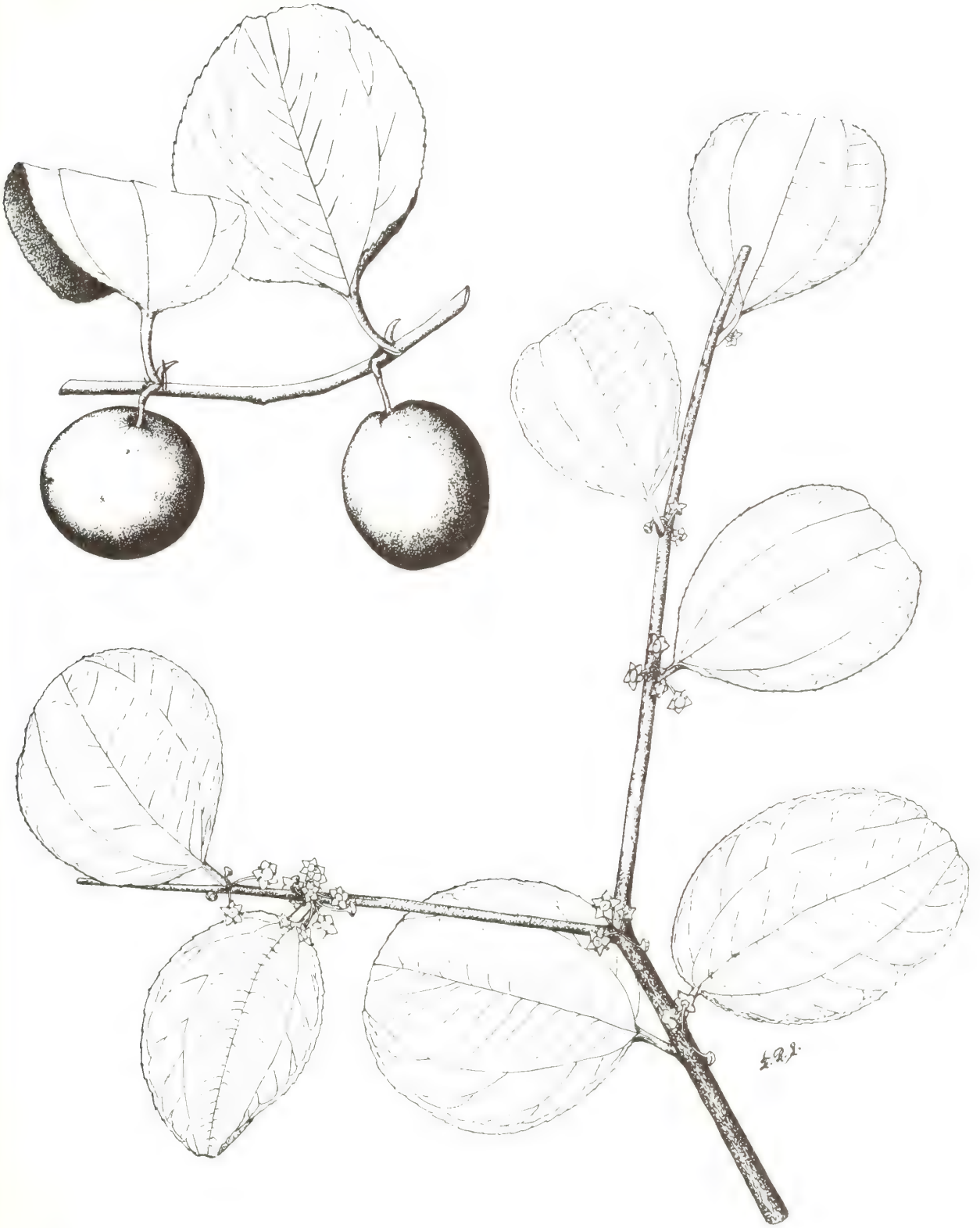
Flower clusters (cymes) at leaf bases are less than 3/4 inch across. Flowers many, short-stalked, composed of bell-shaped base (hypanthium), 5 spreading pointed hairy sepals 1/16 inch long, 5 narrow stalked whitish petals, 5 stamens opposite the petals, and within the disk the pistil with 2-celled ovary and 2-forked style. The edible fruits (drupes) have a large 2-celled stone and 2 elliptic flattened brown seeds 1/4 inch long. Flowering and fruiting from spring to fall and with mature fruits in winter.

Planted sparingly as a fruit tree, mostly in dry areas, in a few residental areas of Puerto Rico and escaping in coastal thickets and clearings, recorded from Guánica. Becoming common and naturalized on Vieques and Culebra. Also Virgin Gorda.

RANGE.—Native of India and southeast Asia. Cultivated through the tropics, including tropical America from southern Florida and California southward to South America and through the West Indies, becoming naturalized.

OTHER COMMON NAMES.—yuyubí (Puerto Rico); yuyuba (Spanish); perita haïtiana (Dominican Republic); guinda (Colombia); ponsigué (Venezuela); India jujube, jujube (English); dunk (Barbados); dunks (Trinidad); jujubier, pomme malcadi (Haiti); pomme surette (St. Barts); pomme cerotte (Dutch Antilles).

BOTANICAL SYNONYM.—*Ziziphus jujuba* Lam. (not Mill.).



490. Aprín, India jujube *Ziziphus mauritiana* Lam.*

Fruiting twig (upper left), flowering twig (below), natural size.

491. ***Ziziphus rignonii* Delponte**

This small tree often with spines, rare in dry areas, is identified by: (1) elliptic to rounded thick and leathery leaves 1¼–4 inches long and 1–3½ inches wide, hairless, with 3 main veins from base and fine network of veins on both surfaces; and (3) edible rounded or elliptic dark brown fruit ⅜–½ inch in diameter.

Small evergreen tree 15–30 feet high, with rounded crown. Bark dark brown or gray, smooth. The gray angled twigs often have paired slender spines 3/16–⅜ inch long.

The leaves are alternate in 2 rows, with petioles about ¼ inch long. Blades are rounded at apex, rounded and often heart-shaped at base, often rolled under at edges, dark shiny green on upper surface, paler, with raised veins beneath.

The small yellowish green flowers about ⅛ inch across are borne in branched clusters (panicles) at leaf bases. Flowering and fruiting from spring to fall.

Wood light brown, hard.

Uncommon in dry limestone forest from sea level to 300 feet altitude in northeastern Puerto Rico, including Cape San Juan. Also Icacos, Vieques, St. Thomas, Tortola, Virgin Gorda, and Anegada.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, and Anguilla.

OTHER COMMON NAMES.—saona, saona de gente, saona dulce, sopaipo, palpaguano, yagua (Dominican Republic); thorn (Anguilla); cogne-molle, citroin marron, macarbie, zoraille, coquemolle (Haiti).

BOTANICAL SYNONYM.—*Sarcomphalus domingensis* (Spreng.) Krug & Urban.

491. *Ziziphus rignonii* Delponte

Flowering twig (upper right), fruiting twig (lower left), natural size.

492. ***Ziziphus taylorii*** **(Britton) M. C. Johnst.**

This much branched shrub of Mona Island sometimes becomes a small tree. It is identified by: (1) many short crowded slender branches; (2) many small obovate to rounded leaves ½–1 inch long and ⅜–¾ inch wide, notched at apex, slightly thickened and stiff; (3) few small green 5-parted flowers less than ⅛ inch across, at end of twig; and (4) elliptic black stone fruits 5/16 inch long.

Deciduous shrub or small tree to 15 feet high and 4 inches in trunk diameter, densely branched, hairless throughout. Bark gray, smooth, becoming rough with small plates. The twigs are short, slender, and angled, mostly spineless but sometimes with a few small spines to ¼ inch long.

The alternate leaves have short petioles about 1/16 inch long. Blades are short-pointed at base, not toothed on edges, green on upper surface and paler beneath, with 3 main veins from near base and with inconspicuous side veins.

Flowers about ⅛ inch across are on short stalks in small clusters (panicles) at ends of twigs. The bell-shaped base (hypanthium) bears 5 sepals less than 1/16 inch long, 5 narrow stalked petals, and 5 stamens opposite the petals; and the pistil has 2-celled ovary and 2-lobed style. The fruit (drupes) have shallow cup at base. The large stone is 2-celled and 2-seeded. With flowers in spring and fruits in spring and summer.

Rare and local on coastal plain and in dry forest on plateau from sea level to 400 feet on Mona Island, native. Not found elsewhere in Puerto Rico. Mona Island is more than 300 miles southeast of the nearest locality at Grand Turk in eastern Bahama Islands.

RANGE.—Through Bahama Islands (more than 450 miles) from Eleuthera and Cat Island to Great Inagua and Grand Turk and on Mona Island. Not recorded from Greater Antilles.

BOTANICAL SYNONYM.—*Sarcomphalus taylorii* Britton.

The scientific name honors Norman Taylor (1883–1970), botanist of the United States, who collected plants in the Bahamas.

492. *Ziziphus taylorii* (Britton) M. C. Johnst.

Flowering twig (above), fruiting twig (below), natural size.

ELAEOCARPUS FAMILY (ELAEOCARPACEAE)

Trees and shrubs, known by: (1) alternate or opposite simple leaves with stipules, the petioles often with enlargements at both ends (*Sloanea*); (2) flowers often large in clusters (racemes or panicles) or solitary, bisexual, regular, with 4–5 sepals, 4–5 separate petals (none in *Sloanea*), many stamens inserted in disk, and pistil with superior ovary of 2 to many cells with axile placentation and 2 to many ovules and style; and (3) fruit a capsule or berry. (This family is often included in the basswood family, Tiliaceae.) Also vol. 1, p. 324.

Key to species

A. Leaves lance-shaped or oblong, 2–4 inches long, irregularly toothed, with 3 main veins from very oblique base, hairy beneath—493. *Muntingia calabura.**

AA. Leaves elliptic, not toothed on edges, with 1 main vein, hairless or nearly so—*Sloanea.*

B. Leaves 2½–6 inches long, blunt or notched at both ends, petioles ½–1 inch long—494. *Sloanea amygdalina.*

BB. Leaves 6–18 inches long, short-pointed at both ends, petioles ½–3½ inches long—149. Motillo, *Sloanea berteriana* Choisy.

493. Capulín — *Muntingia calabura* L.*

This small fast-growing tree has been introduced in Puerto Rico in recent years for ornament and shade. It is easily distinguished by: (1) the lance-shaped or oblong, irregularly toothed leaves with 3 main veins from the very oblique base, hairy beneath; (2) the lateral flowers ¾–1 inch across the 5 spreading white petals; and (3) the edible round berry, reddish or yellowish, ⅜–⅝ inch in diameter.

An evergreen small tree to 25 feet high, with trunk to 6 inches in diameter and short broad crown. Outer bark is smooth and brown, the inner bark whitish, fibrous, and tasteless. Twigs are gray with minute star-shaped hairs when young, afterwards turning brown.

The leaves are alternate in 2 rows on spreading nearly horizontal twigs. The short hairy petioles are ⅛–¼ inch long. Leaf blades are 2–4 inches long and ¾–1⅜ inches wide, with long point at apex, thin, the upper surface green with soft hairs, and the gray-green lower surface covered with star-shaped hairs.

Flowers are 1–3 on stalks ¾–1¼ inches long at leaf bases. There are 5 narrow green sepals about ¼ inch long, turned back; 5 rounded white petals ¼–⅜ inch long; many yellow stamens 3/16 inch long; and on a disk the greenish pistil 3/16 inch long with 5-celled ovary and 5 stalkless stigmas. The fruit (berry) is reddish or yellowish, with stigmas at apex, juicy and slightly sweet, containing many minute light brown seeds. Flowering and fruiting continuously through the year.

The sapwood is lighter colored than the pale brown heartwood. The wood is described as lightweight, medium-textured, of irregular grain, very easily worked, but poorly resistant to decay.

Tough silklike fibers of the bark have been used elsewhere for making rope and baskets. The flowers have served in home remedies. The red berries are juicy and slightly sweet, though without distinctive flavor.

Commonly planted in recent years as an ornamental and small shade tree around houses in new suburbs in moist parts of Puerto Rico. Also in Culebra and Vieques. Its main advantage is rapid growth in full sunlight. Before many years the trees may spread from cultivation into open areas like weeds, as in the native home.

RANGE.—Native from southern Mexico to Venezuela, Trinidad and Tobago, Brazil, Bolivia, and Peru. Also Cuba, Jamaica, and Hispaniola. Sparingly introduced elsewhere in West Indies and south Florida and escaping from cultivation. Planted also in Hawaii and other Pacific Islands. Recorded as naturalized in Asia.

OTHER COMMON NAMES.—memiso (Dominican Republic); capulí (Cuba, El Salvador); capulina, memiso, guácima cereza, guácima boba (Cuba); capulín (Mexico, Central America); capulín blanco (Guatemala, Costa Rica); capulín de comer (El Salvador); pasito, majagüillo, (Panama); chitató, majagüito, chirriador, acuruco, tapabotija, nigua (Colombia); majagüillo, majagua, guácimo hembra, cedrillo, nigüito, majagua (Venezuela); nigüito (Ecuador); bolina, yumanaza (Peru); Jamaica-cherry, strawberry-tree (United States); bois d'orme, bois de soie marron (Haiti); calabura, pau de seda (Brazil).

A closely related species (*Muntingia rosea* Karst.) or variety local in northern Venezuela has slightly larger pinkish purple petals and larger leaves. It would be more attractive as an ornamental than the white-flowered tree.

493. Capulín *Muntingia calabura* L.*

Natural size.

494. ***Sloanea amygdalina* Griseb.**

This rare tree in mountain forests of western Puerto Rico is characterized by: (1) elliptic leaves blunt or notched at both ends, with sunken veins, and with a swelling and bend at upper end of petiole; (2) flowers 1–3 long-stalked at leaf base, about 1 inch across the many stamens; (3) elliptic seed capsules ⅝–1 inch long, hanging down on stalks 2 inches or more in length, covered with short prickly bristles 1/16 inch long, splitting open in 4 parts.

Evergreen large tree 60–90 feet high with trunk 1½–6 feet in diameter, with tall narrow buttresses to 12 feet high and 3 feet wide, straight axis, and narrow crown. The bark is brown, smooth, becoming slightly fissured. Inner bark is light brown, gritty and tasteless. The brown twigs, finely hairy when young, have raised rounded leaf scars longer than broad.

The alternate leaves have finely hairy petioles ½–1 inch long. Leaf blades are 2½–6 inches long and 1¾–3½ inches wide, slightly wavy on edges, slightly thickened and leathery, hairless. The upper surface is green and slightly shiny with sunken veins, the lower surface shiny yellow green with raised veins.

Flowers hanging on stalks ⅝–1¼ inches long. There are 4 pointed sepals about ⅜ inch long velvety within, no corolla, many hairy spreading stamens, and pistil with bristly hairy ovary and style. The seed capsules, yellow green and finely bristly hairy when immature, have calyx bent back at base and pointed style at apex. The bristles covering the fruits are prickly when touched. Flowering in spring and fruiting in summer.

The sapwood is whitish and hard.

Rare in upper Cordillera and moist limestone forests at 500–2,000 feet altitude in western Puerto Rico.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—chicharrón (Dominican Republic); jicotea, berijúa, juba blanca, cresta de gallo (Cuba).

This species was not listed from Puerto Rico by Britton and Wilson (*10*), though Britton collected a sterile specimen in 1915.

494. *Sloanea amygdalina* Griseb.

Natural size.

MALLOW FAMILY (MALVACEAE)

Herbs, shrubs, and few trees, known by: (1) fibrous bark with sap often mucilaginous; (2) alternate simple leaves, toothed or often lobed, palmate-veined, with star-shaped hairs and large paired stipules; (3) flowers commonly large and showy, solitary or in clusters (cymes), bisexual, regular, often with greenish scales (bracts) below the calyx of 5 sepals or lobes, with 5 colored petals, separate but united at base into column, stamens very numerous in a column around style with separate filaments and 1-celled anthers, and pistil with superior ovary of many cells in a ring, each with 1 to many ovules, and long style with many divisions and stigmas; and (4) fruit usually a capsule or separating into 1-seeded parts. Also vol. 1, p. 326.

Key to species

A. Leaves lobed or toothed on edges.
  B. Leaves mostly with 3 (sometimes 5) long-pointed lobes, not toothed—495. *Gossypium barbadense.**
  BB. Leaves toothed on edges.
    C. Leaves coarsely toothed, with 5 main veins from rounded or short-pointed base—497. *Hibiscus rosa-sinensis.**
    CC. Leaves finely wavy-toothed, with 7–9 main veins from slightly notched or heart-shaped base—498. *Sida eggersii.*
AA. Leaves not lobed or toothed on edges.
  D. Leaves with mostly 9 or 11 main veins from base; lower leaf surfaces densely covered with gray star-shaped hairs.
    E. Leaves with lower leaf surfaces whitish gray; flowers 3–3½ inches long; seed capsules with calyx remaining at base; small spreading tree with short crooked trunk.—150. Emajagua, sea hibiscus, *Hibiscus tiliaceus* L.*
    EE. Leaves with lower surfaces gray green; flowers 3–5 inches long; seed capsules without calyx at base; large tree with tall straight trunk—496. *Hibiscus elatus.**
  DD. Leaves with mostly 7 main veins from base, blades with scattered minute scales.
    F. Leaves abruptly long- or short-pointed at apex; flowers with red petals—151. Maga, *Montezuma speciosissima* Sessé & Moc.
    FF. Leaves long-pointed at apex; flowers with pale yellow petals, turning to purple—152. Emajagüilla, otaheita, portiatree, *Thespesia populnea* (L.) Soland.*

495. Algodón, wild cotton — *Gossypium barbadense* L.*

Wild cotton, a shrub or small tree of waste places, is distinguished by: (1) the leaves with mostly 3-lobed blades about 2 inches long, the middle lobe longest, slightly heart-shaped at base, becoming nearly hairless; (2) large bell-shaped flowers about 2 inches long and broad, the 5 light yellow petals with brown dot at base inside, turning to pink, enclosed at base by 3 large light green bracts with long narrow teeth; and (3) elliptic seed capsule about 1 inch long, containing many seeds covered by masses of white threadlike hairs, cotton.

This species of cotton is a spreading shrub, climber, or small tree 12–15 feet in height and 3 inches in trunk diameter. The bark is gray and smooth, the inner bark thick, pink and white streaked, almost tasteless. The twigs are stout, much forked, slightly enlarged at nodes, light green tinged with purple and with many black dots, nearly hairless. The buds are composed of long narrow stipules covering the minute young leaves.

The alternate leaves have paired narrow stipules about ⅜ inch long, which shed early, and slender round, light green petioles 1–1½ inches long. Blades are mostly ovate, about 2 inches long and 1¾ inches wide, mostly 3-lobed with 3 main veins from base sometimes 5-lobed or not lobed, with middle lobe longest, thin, the upper surface dull green and hairless, the lower surface dull light green and becoming nearly hairless.

The flowers are borne singly at leaf bases on stout stalks about ½ inch long. At the base of each flower are 3 ovate light green bracts about 1¼ inches long, each ending in a few long-pointed teeth. The flower is composed of a light green tubular calyx ⅜ inch long and broad, 5-toothed; the bell-shaped corolla about 2 inches long, of 5 light yellow petals with brown dot at base inside, broadest at the rounded apex and united at base, turning to pink upon withering; stamens many in a whitish column 1 inch long, united to corolla at base, the corolla and stamens falling together; and pistil more than 1¼ inches long inside stamen tube, consisting of conic 4-celled ovary with many ovules, long style, and stigma.

The seed capsule with calyx at base becomes brown and splits into 4 parts, releasing the

95. Algodón, wild cotton *Gossypium barbadense* L.*

Two-thirds natural size.

seeds covered with masses of threadlike white fibers of cotton which remain attached. Flowering and fruiting from spring to fall.

The long whitish hairs covering the seeds of this and related species are the valuable fiber cotton. A honey plant.

Purified cotton or absorbent cotton is widely used in medicines as a dressing for wounds. Cotton root bark has served as a drug.

Uncommon in waste places and appearing after cultivation in dry limestone and coastal forest zones from sea level to 200 feet altitude in southwestern Puerto Rico. Also Mona, St. Croix, Jost Van Dyke, Tortola, Virgin Gorda, and perhaps other islands.

PUBLIC FORESTS.—Guánica.

RANGE.—Florida, Greater Antilles, Lesser Antilles. Widely planted in the New World and Old World tropics and spreading from cultivation.

OTHER COMMON NAMES.—algodón silvestre, algodón del país, algodón de Barbados (Puerto Rico); algodón, palo de algodón, algodonero (Spanish); tree cotton, cotton, long-staple cotton, Sea Island cotton (English); coton (French); Creole cotton (Dutch Antilles).

Other species and hybrids of cotton, herbs and shrubs mostly not reaching tree size are persistent after cultivation. However, cotton is not a commercial crop on these islands at present. Because of hybridization, identification is uncertain. The Arawak Indians had cotton. Additional varieties were introduced from Spain, Africa, continental tropical America, and afterwards from the United States. Apparently the common cultivated variety was Sea Island cotton (*Gossypium barbadense* L.* or *G. arboreum* L. var. *nadam* (Watt.) Prokh.*).

496. Majó, mahoe — *Hibiscus elatus* Sw.*

Mahoe, an introduced forest tree is distinguished by: (1) long-stalked heart-shaped and nearly round abruptly pointed leaves with mostly 9 main veins from base, the lower surface gray green with minute star-shaped hairs and with 1–3 narrow glands near base of main veins; (2) large funnel-shaped flowers 3–5 inches long and broad, the 5 petals changing color during the day from yellow with dark red base to orange and red; and (3) elliptic seed capsules 1–1½ inches long, densely yellow brown hairy, which split into 5 parts.

Evergreen medium-sized planted tree becoming 80 feet high with tall straight trunk 15 inches in diameter, or larger. The bark is gray, smooth to finely fissured. Inner bark is fibrous. whitish to whitish green, and slightly bitter. Twigs are green with star-shaped hairs when young and have rings at nodes.

The alternate leaves have slender round leafstalks 2½–4 inches long and 2 oblong short-pointed slightly hairy light green stipules 1¼ inches long, which shed, leaving a ring scar around twig. Blades are about 5–7 inches long and broad, abruptly short- or long-pointed at apex and heart-shaped or notched at base, very slightly thickened, with straight or finely wavy edges, the upper surface is green and hairless.

One to 3 flowers each lasting a day are borne at leaf bases at the ends of twigs on stout green stalks ½ inch long. Around the flower is a light green tube (involucre) ½ inch long, ending in 9 pointed lobes. The calyx is 1½–2 inches long, light green and finely hairy, composed of tube and 5 long spreading lobes. The corolla consists of 5 spreading narrowly elliptic petals 3½–5 inches long, united at base, when opening in the morning yellow with large dark red spot inside at base, in late afternoon turning to orange and red or red bronze. Many stamens are on a whitish or pinkish column or tube with corolla at base. The pistil inside the stamen tube has a hairy 5-celled ovary, long style, and 5 rounded stigmas. The seed capsules contain many hairy seeds. Flowering irregularly through the year.

The sapwood is light brown, the heartwood bluish, greenish, or streaked when freshly cut. The wood varies from soft, fine-textured, with silky luster to hard, of medium to coarse texture, and rather dull. Where this species is native, wood with attractive colors has been prized for cabinetwork, furniture, interior trim, and gunstocks. Other uses include construction, railway ties, and shingles.

Bark of young trees makes good ropes, but this use destroys the growing tree and is to be discouraged. Formerly the lacelike inner bark was used for tying bundles of Havana cigars and was called Cuba bark. An infusion of the mucilaginous leaves and young twigs has been used in home remedies.

Majó or mahoe is closely related to No. 150, emajagua or sea hibiscus (*Hibiscus tiliaceus* L.*), a small tree of seashores throughout the tropics, probably of Old World origin and naturalized in America including roadsides and swampy areas in lower mountain regions of Puerto Rico and the Virgin Islands. Native only in upland parts of Cuba and Jamaica, and

496. Majó, mahoe *Hibiscus elatus* Sw.*

Flowering twig and fruits (right), two-thirds natural size.

also regarded as a variety of the latter. However, the latter differs in being a small spreading tree, leaves densely hairy beneath, smaller yellow flowers, and smaller seed capsules with calyx remaining at base.

This species is being tested locally in Puerto Rico in experimental forest plantations and is sparingly used for ornament. It grows rapidly, reaching a height of 60 feet in 10 years. There is a red-flowered form in Mayaguez.

Planted as a fast growing handsome shade tree in southern Florida, being resistant to salt spray.

PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Guilarte, Luquillo, Río Abajo, Toro Negro, Vega.

RANGE.—Cuba and Jamaica. Planted also in Puerto Rico and Hispaniola.

OTHER COMMON NAMES.—emajagua excelsa (Puerto Rico); majagua, majagua azul (Cuba); Cuban bast (Florida); blue mahoe, mountain mahoe, Cuba-bark (Jamaica).

BOTANICAL SYNONYM.—*Paritium elatum* (Sw.) G. Don.

497. Pavona, hibiscus, Chinese hibiscus — *Hibiscus rosa-sinensis* L.*

Pavona or amapola, the well-known introduced ornamental shrub, sometimes becomes a small tree and is included here. It is recognized by: (1) ovate shiny dark green leaves with 5 main veins at base and coarsely toothed toward long-pointed apex; and (2) solitary large red, purple, or white trumpet-shaped flowers 3–5 inches long and broad, with 5 spreading rounded petals and a long column bearing many stamens and 5 style branches.

Evergreen cultivated shrub commonly 10 feet or less in height, sometimes a small tree to 15 feet high and 3 inches in trunk diameter, commonly with several stems from the base. Bark gray, smooth, the inner bark pale green and tasteless. The twigs are green to dark purple with light dots (lenticels), almost hairless.

The alternate leaves have long dark purple leafstalks ½–2 inches long and paired hairlike stipules ¼ inch or more in length, finely hairy. Blades are 3–5 inches long and 1½–2½ inches wide, sometimes somewhat larger, rounded or short-pointed at base, thin, hairless, the lower surface dull light green.

The flowers are borne one at a time at base of an upper leaf on a slender stalk 3 inches or more in length. A flower has at base 6–7 spreading narrow green scales; bell-shaped light green calyx ⅞ inch long, with 5 spreading pointed lobes; corolla of 5 spreading red, purple, or white petals rounded and sometimes wavy-toothed, united at base; many stamens in a long column or tube 3–4 inches long, of the same color, united with corolla at base; and pistil with 5-celled ovary, long style 5-branched at apex, and 5 rounded stigmas. Seed capsules, not produced in the cultivated plants, are about 1 inch long and many-seeded. Flowering throughout the year.

Pavona is a popular ornamental, widely grown for blossoms and as a hedge. It roots readily from cuttings and can be trimmed into hedges of various heights including windbreaks. There are many varieties and hybrids differing in flower color and other characters. A double-flower variety has additional petals. The petals turn black when crushed and have been used elsewhere as shoe polish, as suggested by the common name shoe-black. Also, it is reported that the petals rubbed on paper produce a bluish purple tint that serves like litmus paper in chemical acidity tests. The plants are very susceptible to attack by an introduced scale insect (*Cerococcus deklei*).

Commonly planted in Puerto Rico and Virgin Islands. Also in southern Florida, southern Texas, southern Arizona, and Hawaii. In Florida many varieties are grown as landscape plants and in gardens.

PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Toro Negro.

RANGE.—Native of tropical Asia, apparently from China to India, but widely grown for ornament in tropical and subtropical regions.

OTHER COMMON NAMES.—amapola, pavón, candelá, candelada, carta abierta, marimoña, hibisco (Puerto Rico); Chinese-rose (Virgin Islands); amapola, mar pacífico (Spanish); sangre de Cristo, cayena (Dominican Republic); tulipán (Mexico); clavel, clavelón (Central America); clavel japonés (El Salvador); campana (Honduras); papo (Panama); resucito (Colombia); hibiscus, Chinese hibiscus, Chinese-rose (English); red hibiscus (Hawaii); shoe-black (Jamaica, Haiti); hibiscus (French); hibisc, cayena, cayena dobbel (Dutch Antilles); resplandor, papoula (Brazil).

97. Pavona, Chinese hibiscus *Hibiscus rosa-sinensis* L.*

Natural size.

498. ***Sida eggersii* E. G. Baker**

This species, now known from a single tree at Jost Van Dyke, is one of the very rarest native trees. It is recognized by: (1) broadly ovate wavy-toothed leaves with 7–9 main veins from base and with both surfaces gray green from the cover of minute star-shaped hairs; (2) the light gray twigs covered with pale yellow scale hairs when young; and (3) yellow flowers about ¾ inch long at leaf bases.

Deciduous tree 20 feet high and 4 inches in trunk diameter, recorded to 26 feet tall and 6 inches in trunk diameter. The bark is gray and smooth, the inner bark yellow brown, fibrous, and tasteless. Branches and twigs are light gray and smooth. The stout twigs bear many raised half-round leaf scars.

The alternate leaves are borne several together near the ends of the twigs. There are 2 minute stipules at the base of a leaf. Petioles are ½–1½ inches long. The blades are mostly 1½–2½ inches long and 1¼–1¾ inches wide, recorded to 6 inches long, long-pointed at apex, slightly notched or heart-shaped at base, finely wavy-toothed at edges, slightly thickened.

Flower clusters (panicles) at base of leaves bear a few crowded nearly stalkless flowers. The flower is composed of bell-shaped velvety hairy calyx ½ inch long with 5 pointed lobes, 5 yellow petals, many stamens in a long column, and pistil with hairy 5–6-celled ovary. The fruit separates into 5–6 hairy parts ⅛ inch long, each containing 1 hairy seed. Collected with flowers in March.

The wood is light brown and slightly hard.

Very rare in seasonal deciduous forest or dry scrub woodland at about 800 feet altitude on Jost Van Dyke. Discovered on Tortola and afterwards found on Culebra in dry coastal hills at 100–300 feet altitude.

RANGE.—Known only from 1 tree of Jost Van Dyke. Apparently extinct at Tortola and Culebra.

BOTANICAL SYNONYM.—*Abutilon virginianum* Krapovickas.

Britton and Wilson (*10;* 5:555) called this "one of the most interesting species of our Flora." It was named in 1892 for Heinrich Franz Alexander Baron von Eggers (1844–1903), German botanist who studied the plants of the Virgin Islands during many years beginning 1870 and who published a flora (*21*). He discovered it on Tortola, where it has not been collected since. Obviously, it was rare as he found it nowhere else. Afterwards, this species was collected twice on Culebra, by N. L. Britton and W. M. Wheeler in 1906 and by J. A. Shafer in 1913. An old report from St. Thomas might have referred to this species, though apparently no specimen has been preserved.

The tree discovered on Jost Van Dyke on April 12, 1967, was mentioned in the tree list of that island (*50*). On that date it had neither flowers nor fruits but was producing new leaves after having been leafless. Perhaps seeds or propagating material should be obtained and the species introduced to cultivation in botanical gardens before it becomes extinct.

Trees are rare in the genus *Sida*, and this species has been transferred recently to the genus *Abutilon*. Somehow this endemic tree species evolved from much smaller ancestors and spread to what are now 3 or 4 separate islands.

498. *Sida eggersii* E. G. Baker

Twig with flower buds, natural size.

BOMBAX FAMILY (BOMBACACEAE)

Trees often giants, rarely shrubs, known by: (1) trunks often stout or very broad, sometimes greenish and spiny, with mucilaginous sap; (2) leaves generally deciduous, alternate, mostly digitate, also simple and sometimes lobed, and palmate-veined, with star-shaped hairs or minute scales, with stipules; (3) flowers generally large and showy, often when leaves are absent, solitary or in lateral clusters, bisexual, usually regular, sometimes irregular, with calyx cuplike or 5-lobed, 5 petals sometimes hairy on outside, 5 to many stamens separate or united in tube, and pistil with superior ovary of 2–5 cells each with 2 to many ovules, style, and 1–5 stigmas; and (4) fruit a capsule or berry with many seeds sometimes enclosed in hairs. Also vol. 1, p. 332.

Key to species

A. Leaves palmately compound (digitate) with 5–9 leaflets.
  B. Leaflets saw-toothed on edges.
    C. Petioles short, less than 2½ inches long—500. *Ceiba aesculifolia.**
    CC. Petioles longer, 2½–5 inches long—501. *Chorisia speciosa.**
  BB. Leaflets not toothed on edges.
    D. Leaflets narrow, mostly lance-shaped—153. Ceiba, silk-cotton-tree, *Ceiba pentandra* (L.) Gaertn.
    DD. Leaflets mostly broad, oblong or obovate to elliptic.
      E. Leaflets oblong, hairy beneath—499. *Adansonia digitata.**
      EE. Leaflets obovate to elliptic, hairless or nearly so beneath—502. *Pachira insignis.**
AA. Leaves simple.
  F. Leaves with 5–9 main veins from base—154. Guano, balsa, *Ochroma pyramidale* (Cav.) Urban.
  FF. Leaves with 1 main vein or midrib—155. Garrocho, *Quararibea turbinata* (Sw.) Poir.

499. Baobab — *Adansonia digitata* L.*

Baobab, an African tree noted for its enormous trunk, is a rare shade and ornamental tree in the Virgin Islands. Distinguishing characters are: (1) the very thick stout but short tapering trunk; (2) palmately compound leaves (digitate) of 3–7 elliptic leaflets not toothed on edges, hairy beneath; (3) large drooping whitish flowers 5–6 inches across, borne on long stalks when trees are leafless; and (4) large oblong yellowish-brown gourdlike fruits 6–12 inches long and 2–3½ inches in diameter, bristly hairy on the outside and mealy within, hard-walled and not splitting open.

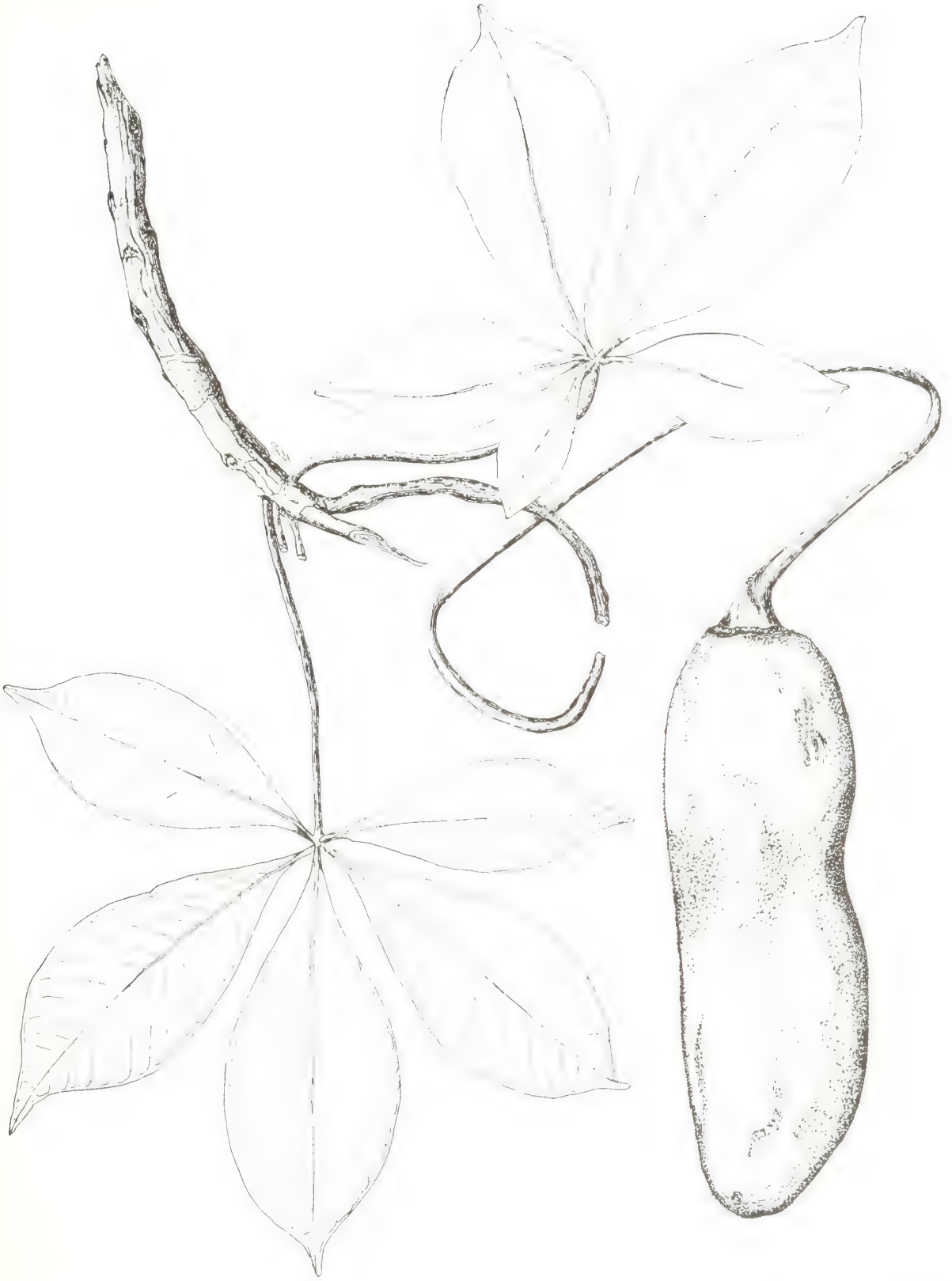
A medium-sized to large deciduous planted tree about 50 feet high and 6 feet or more in trunk diameter, somewhat larger in age where native. The crown is relatively broad, exceeding the height, but is leafless in the relatively dry winter season. The bark is smoothish and the inner bark is fibrous. Twigs stout, finely hairy when young.

The alternate leaves have finely hairy petioles 4–5 inches long. Leaflets are 3–6 inches long and 1–2½ inches wide, abruptly long-pointed at apex and gradually narrowed to long-pointed base. Leaves on young plants have only 3 leaflets.

The large flowers are borne singly on very long drooping stalks at leaf bases. The calyx is 2–3 inches long, deeply 5-lobed, leathery, and silky hairy within; 5 narrow petals becoming curved back; very many white threadlike stamens with purple dotlike anthers spreading 2 inches across from a tube 1½ inches high in lower half; and the pistil has a bristly hairy 7–10-celled ovary, slender style, and 7–10-lobed stigma. The hard woody fruits hang from long stalks and contain many kidney-shaped seeds in dry mealy pulp.

Baobab is a tree of great size and age. In trunk diameter, as much as 30 feet, it ranks among the world's largest trees, though its maximum height is only about 60 feet. Giant trees apparently are very old, but the hollow trunks of soft spongy lightweight wood cannot be dated precisely.

The spongy mealy fruits of baobab are sour but reported to be edible. These hard-walled fruits do not contain hairs or fibers as do the seed capsules of ceiba or silk-cotton-tree, balsa,



499. Baobab *Adansonia digitata* L.*

Leafy twig and fruit (lower right), two-thirds natural size.

and other relatives. Where the trees are native, the leaves have been cooked and eaten as a vegetable. Also, the seeds have been prepared into meal. Rope has been made from the fibrous bark.

Baobab is rare in St. Croix and St. Thomas. It was recorded more than a century ago as naturalized in St. Croix but would not be so classed now. Young trees were grown experimentally in Puerto Rico but apparently were not preserved. Planted in parks and gardens in tropical regions of the world, north to southern Florida and in Hawaii.

RANGE.—Native of dry desertlike regions of tropical Central Africa.

OTHER COMMON NAMES.—Baobab (English Spanish, French); Guinea tamarind (St. Eustatius); mapou zombi (Haiti).

The generic name commemorates Michel Adanson (1727–1806), French botanist and explorer.

500. Pochote ***Ceiba aesculifolia*** **(H.B.K.) Britten & Baker***

This ornamental and shade tree is related to the native species No. 153, ceiba or silk-cotton-tree, *Ceiba pentandra* (L.) Gaertn. Recognized by: (1) spines on trunk and twigs; (2) palmately compound leaves (digitate) with 5–8 elliptic leaflets saw-toothed on edges; (3) large flowers with 5 narrow yellowish hairy petals 4–6 inches long; and (4) large narrowly elliptic or oblong brown seed capsules 5–7 inches long, containing many seeds in cottony hairs.

A medium-sized to large deciduous planted tree with stout conic spines on the large smoothish trunk and with spreading crown. Twigs are stout and often spiny.

The alternate leaves have slender finely hairy petioles 1½–2½ inches long. The leaflets are 2–6 inches long and ¾–2 inches wide, whitish green beneath, short- to long-pointed at apex, long-pointed at base with hairy stalk less than ¼ inch long.

The large flowers on short stout stalks have a bell-shaped calyx ¾–1¼ inches long; corolla of 5 narrow yellowish hairy petals 4–6 inches long, spreading and curved; 5 slender stamens longer than petals; and pistil with 5-celled ovary and long slender style. The smooth seed capsules split open along 5 lines. Many small elliptic brown seeds 3/16 inch long are borne in a mass of brownish or white cottony hairs.

Uncommon as an ornamental and shade tree in Puerto Rico. In Guatemala the trees have been planted also for cottony fibers, which have been exported. These fibers like kapok from related species serve for stuffing pillows and mattresses, for insulation, and other uses.

RANGE.—Native of southern Mexico, Guatemala, Honduras, and El Salvador, but introduced beyond in tropical America.

OTHER COMMON NAMES.—pochote, ceiba (Spanish); ceibillo, algodón de monte, palo lagarto (Guatemala); ceibillo (El Salvador).

500. Pochote

Ceiba aesculifolia (H.B.K.) Britten & Baker*

Two-thirds natural size.

501. Chorisia, floss-silk-tree ***Chorisia speciosa* St. Hil.***

This relative of ceiba is one of the world's most beautiful flowering trees. It has been sparingly introduced for its showy flowers mostly in winter when leafless or nearly so. Characters for recognition are: (1) spines on trunk and branches; (2) palmately compound (digitate) leaves with 5–7 narrowly elliptic leaflets saw-toothed on edges; (3) large showy mostly pink flowers 3–4 inches long and 4 inches broad, covering the trees when leafless; and (4) fruit a large pear-shaped capsule about 8 inches long bearing many seeds in whitish silky hairs.

Medium-sized deciduous planted tree 35 feet high with spiny columnar greenish trunk 1 foot in diameter, probably becoming larger and swollen in age, and with widely spreading crown of coarse branches.

The alternate hairless leaves have slender petioles about 2½–5 inches long. The leaflets are attached at end of petiole by short stalks ¼–½ inch long. Blades are 2–5 inches long and ½–1½ inches broad, long-pointed at apex and short- to long-pointed at base, paler beneath.

The large flowers at leaf bases or in clusters (racemes) have a stout stalk ½ inch long. The bell-shaped tubular calyx is about 1 inch long, irregularly 3–5-lobed at apex. There are 5 oblong or spoon-shaped spreading petals 3–4 inches long, mostly deep pink with whitish or yellowish base, spotted with purplish streaks, wavy margined, finely hairy on outside; the stamens are united into a double tube, the outer short with hairy sterile stamens, the inner 2½–3 inches long and very narrow, with ring of anthers at apex; and within the stamen tube the pistil with 5-celled ovary containing many ovules, long slender style longer than stamen tube, and 5-lobed stigma. The fruit is a woody pear-shaped capsule 6–8 inches long. Many small seeds like peas are produced in a mass of silky or cottony hairs. Flowering in winter.

The wood is soft, lightweight, and not used.

The soft silky and cottony hair or fiber of the seed capsules, like that of ceiba and related species, has served for pillows and cushions.

Rarely planted as an ornamental and street tree in Puerto Rico. Cultivated elsewhere in the tropics including West Indies and from southern Florida (where recommended), southern Arizona, and southern California south to Brazil and Argentina. One of the most popular street trees in Buenos Aires and nearby areas.

The plants are propagated by seeds and cuttings and grow rapidly in good well drained soil to a maximum of 50–75 feet in height, flowering in about 8–10 years. Because of their large size, these trees are better for streets, parks, and gardens, than for small yards. The trees will tolerate occasional light frost. Flowers differ in size and in color, ranging in different varieties from deep or pale pink to white and purple.

RANGE.—Native of Brazil and northeastern Argentina.

OTHER COMMON NAMES.—estrella federal (Dominican Republic); corisia (Colombia); palo borracho rosado, samohú (Argentina); floss-silk-tree (English); showy chorisia, silk-floss-tree (United States); paina, paina de seda, paineira, barriguda (Brazil).

501. Chorisia, floss-silk-tree

Chorisia speciosa St. Hil.*

Two-thirds natural size.

502. Shaving-brush-tree ***Pachira insignis*** **(Sw.) Sav.***

An ornamental and shade tree, characterized by: (1) palmately compound leaves with mostly 7 (5–9) large obovate to elliptic leaflets almost stalkless; (2) very large handsome flowers 7–10 inches long with 5 narrow brownish-red petals and numerous spreading threadlike whitish stamens like a shaving brush; and (3) large brown seed capsules 6–10 inches long, rounded or elliptic.

A medium-sized evergreen planted tree with stout trunk becoming buttressed, stout branches in whorls, and spreading crown. The bark is greenish or gray, smooth or becoming slightly fissured, the inner bark light brown and slightly bitter. The twigs are dark green and very stout.

Leaves are alternate but grouped toward end of twig, measuring 10–15 inches long including round petiole 4–7 inches long and enlarged at both ends. Leaflets mostly 7, sometimes 5–9, stalkless or nearly so, 4–9 inches long and 1½–3½ inches wide, broadest toward the rounded or notched apex and gradually narrowed toward base, not toothed on edges, thickened, hairless or nearly so, the upper surface slightly shiny green, and the lower surface dull light green with raised veins.

Flowers are borne 1 or 2 on very stout stalks 1–5 inches long from narrow brown finely hairy buds 7–9 inches long. The calyx is cup-shaped, about 1 inch long and broad, dark brown, finely hairy, and not lobed; the 5 petals are 7–9 inches long, finely hairy; the several hundred threadlike stamens are much branched ending in yellow anthers and united into a reddish tube below; and the pistil inside tube consists of a rounded 5-angled 5-celled ovary, very long style, and lobed stigma. The seed capsules are mostly longer than broad, blunt pointed, finely hairy, heavy, thick-walled, and opening into 5 parts. There are many rounded and 4-angled brownish seeds about 1 inch across. Flowering probably through the year.

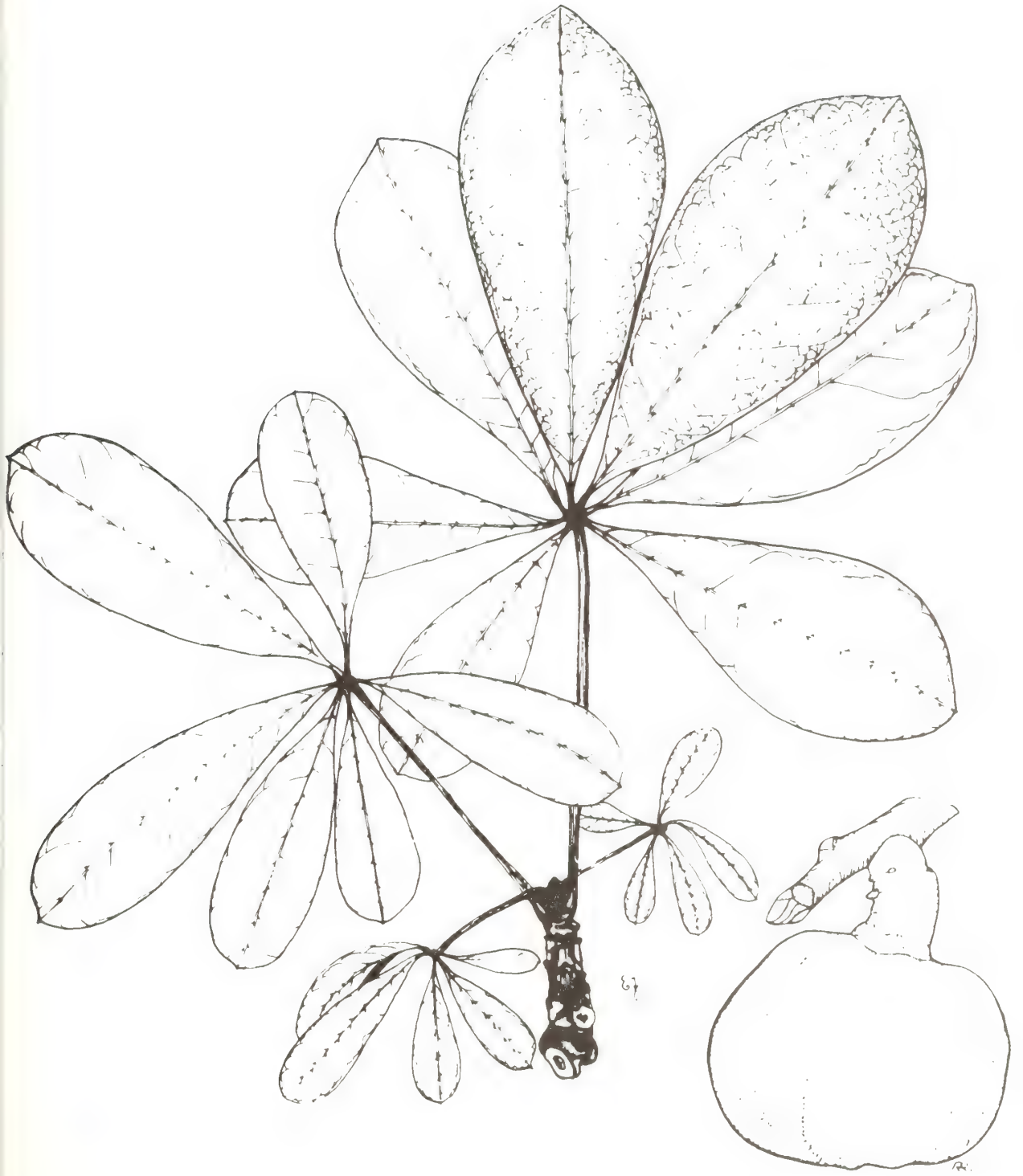
The wood is described as whitish, soft and lightweight, and not used.

It is reported that elsewhere the seeds are eaten after toasting or raw, having a flavor like that of chestnuts, also similar common names. However, the trees are not related to the true chestnuts. A honey plant.

Rare as a planted ornamental and shade tree in Puerto Rico and perhaps Virgin Islands. Elsewhere in the tropics occasionally grown in parks.

RANGE.—Native of northern South America from Colombia to Venezuela, Trinidad and Tobago, Guyana, Brazil, and Peru. Lesser Antilles in Guadeloupe, Martinique, St. Vincent, and Grenada, apparently introduced. Planted in other tropical lands and becoming naturalized.

OTHER COMMON NAMES.—carolina (Dominican Republic, Cuba); flor de huimba (Colombia); castaño, ceibillo (Venezuela); shaving-brush-tree (United States, English); provision-tree (English); chataigne, wild chataigne, chataigne maron, wild breadnut, wild chestnut (Trinidad and Tobago); mamorana grande, munguba preta (Brazil).



502. Shaving-brush-tree *Pachira insignis* (Sw.) Sav.*

Leafy twig, one-half natural size; fruit (lower right), about one-fourth natural size.

CHOCOLATE FAMILY (STERCULIACEAE)

Shrubs, herbs, vines, and trees, known by: (1) alternate simple leaves often palmate-veined and palmately lobed, sometimes digitate, with star-shaped hairs, the petiole often with enlargement at apex, with stipules; (2) flowers usually in lateral or terminal branched clusters (cymes) or sometimes along trunks, generally bisexual and regular with parts in 5's, calyx of 3–5 lobes, 5 petals or sometimes none, 5 stamens united in a tube or separate, sometimes with 5 staminodes, and pistil composed of superior ovary generally with 5 (1–4) cells with 2 to many ovules and 1–5 styles often lobed, sometimes the stamens and pistils on a long stalk; and (3) fruit a capsule or berry or 5 follicles. Also vol. 1, p. 338.

Key to species

A. Leaves palmately compound (digitate) with 5–11 large elliptic leaflets—506. *Sterculia foetida.**
AA. Leaves simple.
B. Leaves deeply 5-lobed, with 5 main veins from notched or heart-shaped base; petiole nearly as long as blade—157. Anacagüita, panama-tree, *Sterculia apetala* (Jacq.) Karst.*
BB. Leaves not lobed.
C. Leaves toothed on edges, mostly hairy, more or less unequal or oblique at base.
D. Leaves coarsely toothed, with 7 main veins from base, soft hairy—504. *Helicteres jamaicensis.*
DD. Leaves finely saw-toothed, with 3 or sometimes 5 main veins from base, hairy or nearly hairless—156. Guácima, jacocalalu, *Guazuma ulmifolia* Lam.
CC. Leaves not toothed on edges, mostly hairless, the base not notched and with equal sides.
E. Leaves with 5 or 7 main veins from base, broadly ovate—505. *Kleinhovia hospita.**
EE. Leaves with 1 main vein from base, elliptic or oblong.
F. Leaves 4–8 inches long, short-pointed at base—503. *Cola acuminata.**
FF. Leaves 8–14 inches long, rounded at base—158. Cacao, chocolate-tree, *Theobroma cacao* L.*

503. Nuez de cola, cola-nut — *Cola acuminata* (Beauv.) Schott & Endl.*

Cola-nut from tropical Africa has been planted experimentally in Puerto Rico. Its characteristics for identification are: (1) oblong to ovate leathery leaves 4–8 inches long and 1½–3½ inches wide; (2) yellowish or whitish star-shaped flowers clustered at leaf bases, ¾–1¼ inches across the starlike spreading 5 calyx lobes; and (3) large fruit of 5 or fewer warty gray-green pods 4–5 inches long, each splitting open on 1 line.

A small evergreen planted tree becoming 15 feet or more in height and 6 inches in trunk diameter. The twigs sometimes have scattered hooked spines ⅛ inch long.

The alternate leaves have slender petioles ½–3 inches long. Leaf blades are abruptly long-pointed at apex, short-pointed at base, not toothed on edges, hairless.

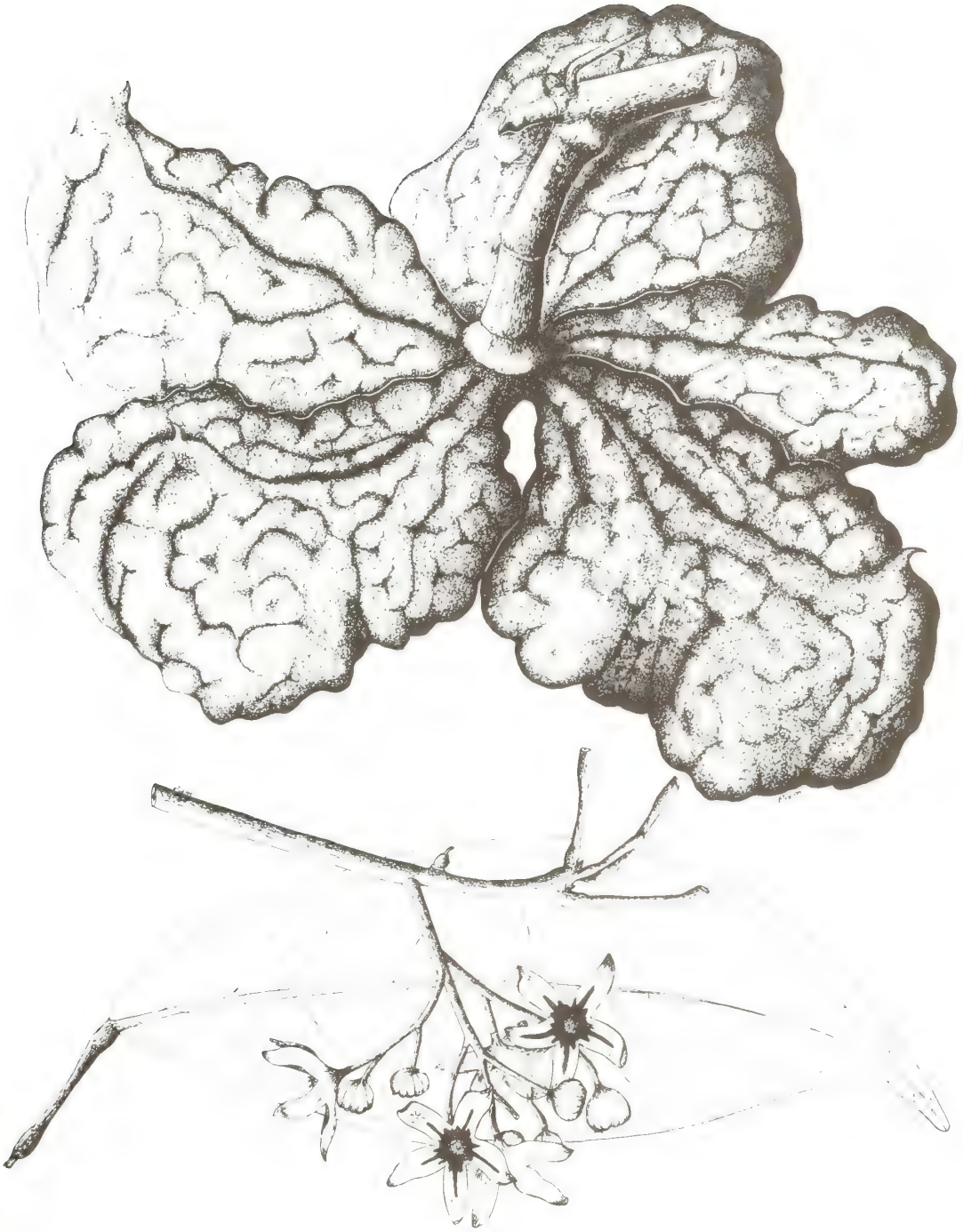
Flower clusters (racemes) to 3 inches long bear at leaf bases several to many flowers partly of one sex, composed of a spreading 5-lobed star-shaped calyx yellowish or whitish with reddish or purplish markings toward base, no corolla, about 10 stamens united into a column, and pistil with 5 or fewer cells and styles. The 5 or fewer fruits (follicles) each contain 6–12 large white to reddish seeds 1–1¼ inches long that become brown on drying. Collected with flowers from October to December.

The bitter seeds or cola-nuts (about 300–600 to a pound) contain caffein and serve as a stimulant when chewed by persons living in Africa where the trees are native. The seeds have been exported in limited quantities for preparations such as wine and medicine. The trees, propagated from seeds, are grown in plantations for the nuts.

RANGE.—Native of west tropical Africa and introduced elsewhere in the tropics.

OTHER COMMON NAMES.—cola, colero, nuez de cola (Spanish); cola-nut, goora-nut, kola, kolanut (English); palo de col (Dominican Republic); bissy (Jamaica).

BOTANICAL SYNONYM.—*Cola vera* K. Schum. The genus repeats the native name.



503. Nuez de cola, cola-nut *Cola acuminata* (Beauv.) Schott & Endl.*

Fruit (above), flowers and leaf (below), two-thirds natural size.

504. Cuernecillo, cowbush ***Helicteres jamaicensis* Jacq.**

This sparsely branched shrub or sometimes a small tree is easily recognized by: (1) dense soft covering or minute gray star-shaped hairs on foliage, flowers, and fruits; (2) coarsely toothed ovate leaves with unequal sides and 7 main veins from the notched base, spreading in 2 rows on long twigs; (3) few whitish irregular flowers with 5 slightly unequal petals 1¼ inches long and threadlike column 2½–3 inches long bearing stamens and pistil; and (4) distinctive conelike cylindric, much twisted gray woolly hairy fruit 1½–2½ inches long and ¾ inch in diameter on a slender stalk 3 inches long above the calyx.

Evergreen shrub about 10 feet high, with few long spreading branches, sometimes a small tree 20 feet high and 3 inches in diameter, not forming a crown. Bark gray, slightly thickened, with conspicuous warts. Inner bark yellowish, turning orange on exposure, slightly bitter. Twigs stout, densely hairy, gray green, becoming gray, ending in hairy buds composed of stipules and young leaves.

Leaves are alternate and spreading in 2 rows and have paired narrow hairy stipules ¼–⅝ inch long and hairy leafstalks ⅜–¾ inch long. Blades are 3–7 inches long and 1½–4 inches wide, long-pointed, coarsely saw-toothed, often with few larger teeth or 2 shallow lobes, soft hairy and slightly thickened, the upper surface green, and lower surface gray green, densely hairy, and with raised veins.

Flowers are few, 1–3 at leaf base or at end of twig, on hairy stalks ¼–¾ inch long, only 1 or 2 opening at a time. The densely hairy gray-green calyx is bell-shaped, about 1 inch long and broad, slightly 2-lipped, with 5 narrow unequal pointed teeth. The 5 white petals are narrow, with 2 lobes on sides, soon falling. A whitish hairy threadlike curved column from the base of the flower bears 10 stamens ⅜ inch long and 5 smaller nonfunctional stamens (staminodes) and the pistil, composed of hairy 5-lobed, 5-celled ovary with many ovules and short bent threadlike style.

The peculiar seed pod, at the end of a slender stalk above the persistent calyx is pointed at both ends and fuzzy gray-green hairy, persistent and weathering to gray and blackish. It is composed of 5 hard parts (follicles) much twisted in a spiral, each opening along a line within. There are many oblong blackish seeds ⅛ inch long. Flowering irregularly through the year.

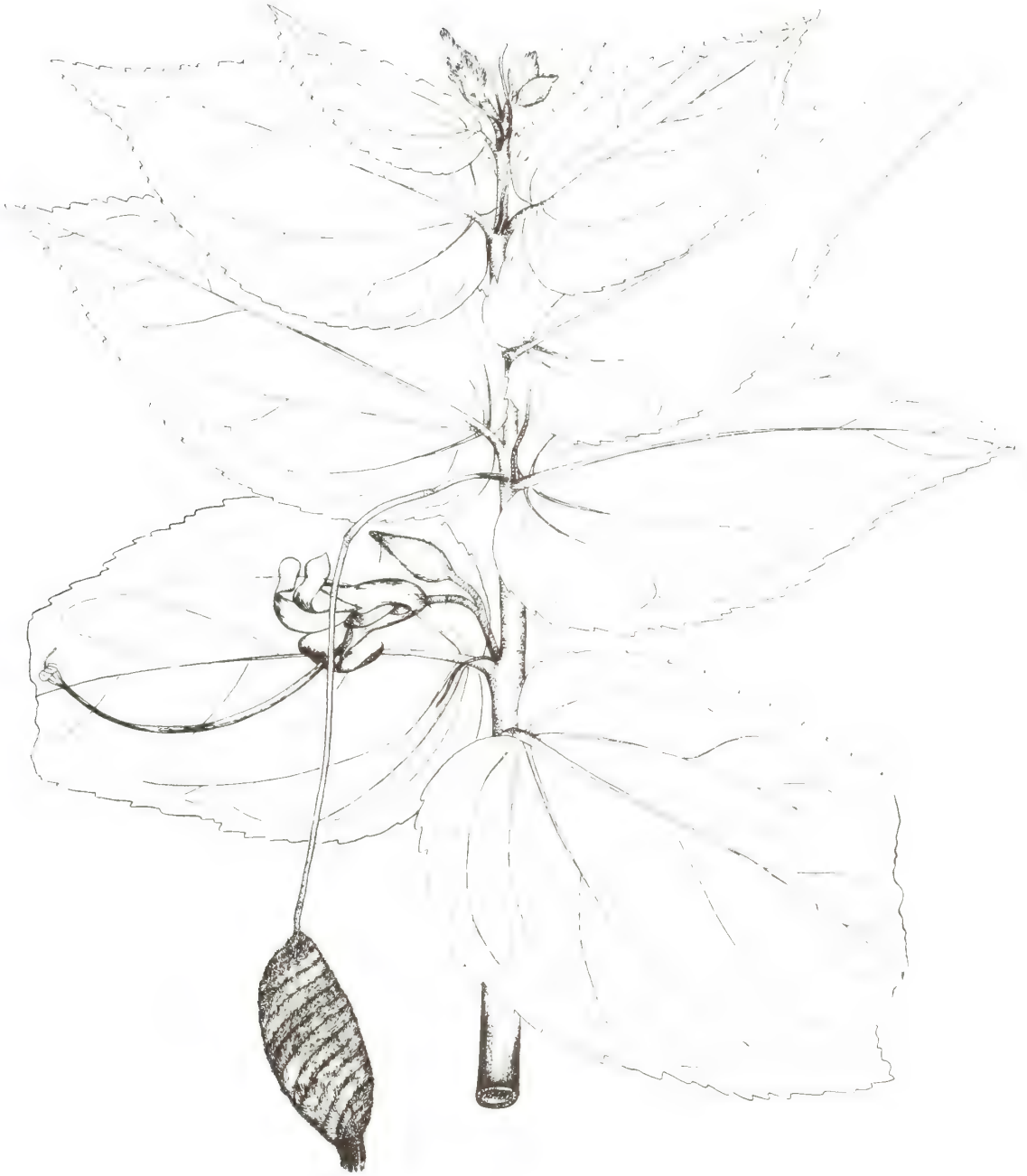
The wood is yellowish, hard and heavy. The fibrous bark is strong and suitable for making rope.

Local at low altitudes in openings, clearings, and thickets in dry and moist coastal and limestone forests from sea level to 400 feet altitude in Puerto Rico. Also Mona, Vieques, Culebra, and adjacent smaller islands. Through Virgin Islands from St. Croix including Buck Island to St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guánica, San Juan, Susúa; Buck Island Reef, Virgin Islands.

RANGE.—Bahamas, Greater Antilles, Virgin Islands, and St. Martin.

OTHER COMMON NAMES.—gato soga, gato (Puerto Rico); majagüilla de costa, tapaculo (Cuba); blind-eye-bush, cowbush, salzbush, wild salve (Bahamas); screwtree (Jamaica); jeucon, cotton rat (Haiti).



504. Cuernecillo, cowbush *Helicteres jamaicensis* Jacq.

Two-thirds natural size.

505. Guest-tree ***Kleinhovia hospita* L.***

The showy masses of many small bright pink flowers make this tree an attractive ornamental. Other characters for identification are: (1) broadly ovate or heart-shaped leaves with 5 or 7 main veins from slightly notched base; and (2) bladderlike fruits, greenish-brown papery or bladdery pods nearly 1 inch long and broad, 5-angled and broadest near apex.

A small evergreen planted tree to 25 feet high, the short often crooked trunk 6 inches in diameter or larger, with dense rounded crown. The bark is gray, fissured and rough. Twigs greenish and finely hairy when young, becoming light brown.

The alternate leaves have slender petioles 2–3½ inches long, slightly enlarged at both ends. The blades are 3–6 inches long and broad, abruptly long-pointed at apex, not toothed on edges, thin, dull green on upper surface, and paler with minute hairs beneath.

Flower clusters (panicles) are terminal and upright, 6–12 inches or more in length, with many finely hairy pinkish branches. The short-stalked slightly irregular flowers about ⅜ inch long and broad are composed of 5 narrow spreading pink finely hairy sepals ⅜ inch long; shorter pink corolla with 4 equal lobes and 1 shorter spurlike yellow-tipped lobe; and at end of a curved stalk 5 stamens and pistil with hairy 5-celled ovary and short style. The bladdery pods or capsules split into 5 parts, each with 1 or 2 rounded seeds about ⅛ inch long. Flowering and fruiting irregularly through the year.

The wood is whitish.

Uncommon as a planted ornamental in Puerto Rico, flowering as a shrub. Elsewhere the trees are grown along roadsides.

RANGE.—Native of tropical southeastern Asia from India to China and Philippines and Pacific Islands, but introduced in other tropical regions.

The generic name honors C. Kleinhof, German physician and botanist, who lived in the West Indies 3 years and 21 in Java.

505. Guest-tree *Kleinhovia hospita* L.*

Fruits (left), leaf, flowers (right), two-thirds natural size.

506. Anacagüita, hazel sterculia ***Sterculia foetida* L.***

This handsome ornamental and shade tree is recognized by: (1) palmately compound leaves with 5–11 large elliptic long-pointed leaflets at end of long petiole; (2) large reddish or purplish star-shaped flowers nearly 1 inch across the 5 narrow finely hairy calyx lobes, with unpleasant odor, several in narrow clusters with new leaves; and (3) fruit of 5 or fewer reddish egg-shaped hard woody pods 2–3 inches in diameter, with seeds attached to margins.

Large deciduous planted tree becoming 50 feet or more in height. Trunk stout, unbranched, often with buttresses at base, with smooth gray bark. Twigs hairless, with stout portions bearing many raised half-round leaf scars and long slender portions without leaf scars.

Leaves alternate, crowded at ends of twigs, hairless except when young, with long slender round petioles to 1 foot long. Leaflets 4–9 inches long, 1½–2½ inches wide, slightly thickened, ending in long narrow point at apex, tapering to narrow stalkless base, not toothed on edges, with many parallel, slightly curved side veins.

Flower clusters (racemes and panicles) mostly unbranched, 4–6 inches long, several near ends of twigs with new leaves, each bearing several flowers on slender stalks ⅛–½ inch long. Flowers partly male and female on the same tree (monoecious), with unpleasant odor, have reddish or purplish calyx divided almost to base into 5 narrow spreading lobes nearly ½ inch long, the upper side densely hairy with star-shaped hairs, and no corolla. Male flowers bear 10–15 minute stamens at the end of a slender curved hairy stalk ¼ inch long. Female flowers have at the end of a stalk a pistil consisting of rounded 5-celled ovary, short style, and 5 short stigmas.

The fruit consists of 5 or fewer pods (follicles) from a flower, each with pointed stigma at apex, finely hairy, hard, thick-walled, turned back and splitting open widely along 1 line, the brownish inner wall without hairs. Seeds mostly 10–15, oblong, ⅞ inch long, blackish.

The wood is reported to be soft and easily worked but subject to attack by insects and not durable.

Elsewhere the large seeds are eaten, especially after roasting. Also, they have served as a substitute for cacao or chocolate, though lacking the distinctive flavor.

Occasionally grown for ornament and shade in Puerto Rico but unpopular because of the bad odor during the short flowering season. A handsome fast-growing ornamental for parks and large gardens. Introduced also through the West Indies, in southern Florida, and south to Brazil.

RANGE.—Native of tropical Asia to Australia and Philippines. Widely planted in tropical countries.

OTHER COMMON NAMES.—chichá, chichá fedorento, xixá, mandobi-de-pau (Brazil).

DILLENIA FAMILY (DILLENIACEAE)

Woody vines, shrubs, and trees, also few herbs, known by: (1) leaves generally alternate, simple, leathery, often rough, usually with stipules; (2) small to large flowers in branched clusters (panicles), bisexual or male and female on different plants (dioecious) or the same plant (monoecious), regular, with 3–5 overlapping persistent sepals, 5 overlapping white or yellow petals, many stamens separate or united at base, mostly persistent, and few to many pistils with superior 1-celled ovary with 1 to many ovules and as many separate styles as pistils; and (3) fruit a follicle or berry, with a covering (aril). Vol. 1, p. 344.

One species: 159. Dilenia, India dillenia, *Dillenia indica* L.*

506. Anacagüita, hazel sterculia *Sterculia foetida* L.*

Leaf (above), opened fruit with seeds (lower left), and flowers and young leaves (lower right), all one-half natural size.

OCHNA FAMILY (OCHNACEAE)

Small to large trees, shrubs, and rarely herbs, known by: (1) alternate simple leaves with border generally toothed, pinnate-veined with many lateral veins, often leathery, hairless, with stipules sometimes large and divided; (2) small to large flowers often showy in clusters (panicles, racemes, or cymes), bisexual, usually regular, with calyx of 4–5 sepals separate or united at base, 4–5 (10) petals often yellow and falling early, stamens 5, 10, or many with anthers often opening by pores, sometimes with staminodes, and pistil composed of superior ovary often deeply lobed on large base (receptacle), generally with 2–5 (rarely 10–15) cells with 1 to many ovules, 1 style, and 1–5 stigmas; and (3) fruit of 1–5 drupes or berries on the very large base (receptacle) or a capsule.

Key to species

A. Leaves thick and leathery, with several large spiny teeth on wavy edges—508. *Ouratea ilicifolia.*
AA. Leaves only slightly thickened, with fine inconspicuous teeth or none.
  B. Leaves broadest toward blunt or rounded apex, with fine inconspicuous teeth—507. *Ochna mossambicensis.**
  BB. Leaves broadest toward base or near middle.
    C. Leaves with fine inconspicuous teeth and many curved side veins becoming nearly parallel with edge; flowers many, ¾ inch across—509. *Ouratea littoralis.*
    CC. Leaves without teeth, with few curved side veins that appear to cross many fine parallel veins; flowers few, ½ inch across—510. *Ouratea striata.*

507. Mozambique ochna — *Ochna mossambicensis* Klotzsch*

An ornamental planted for the showy bright yellow flowers. Distinguished by: (1) oblanceolate or obovate finely saw-toothed leaves, broadest toward the blunt or rounded apex; (2) lateral clusters of large flowers 1¼ inches across the 5 spreading stalked yellow petals, on slender jointed stalks; and (3) fruit of 5 or fewer black elliptic fruits on enlarged base and bordered by 5 red sepals.

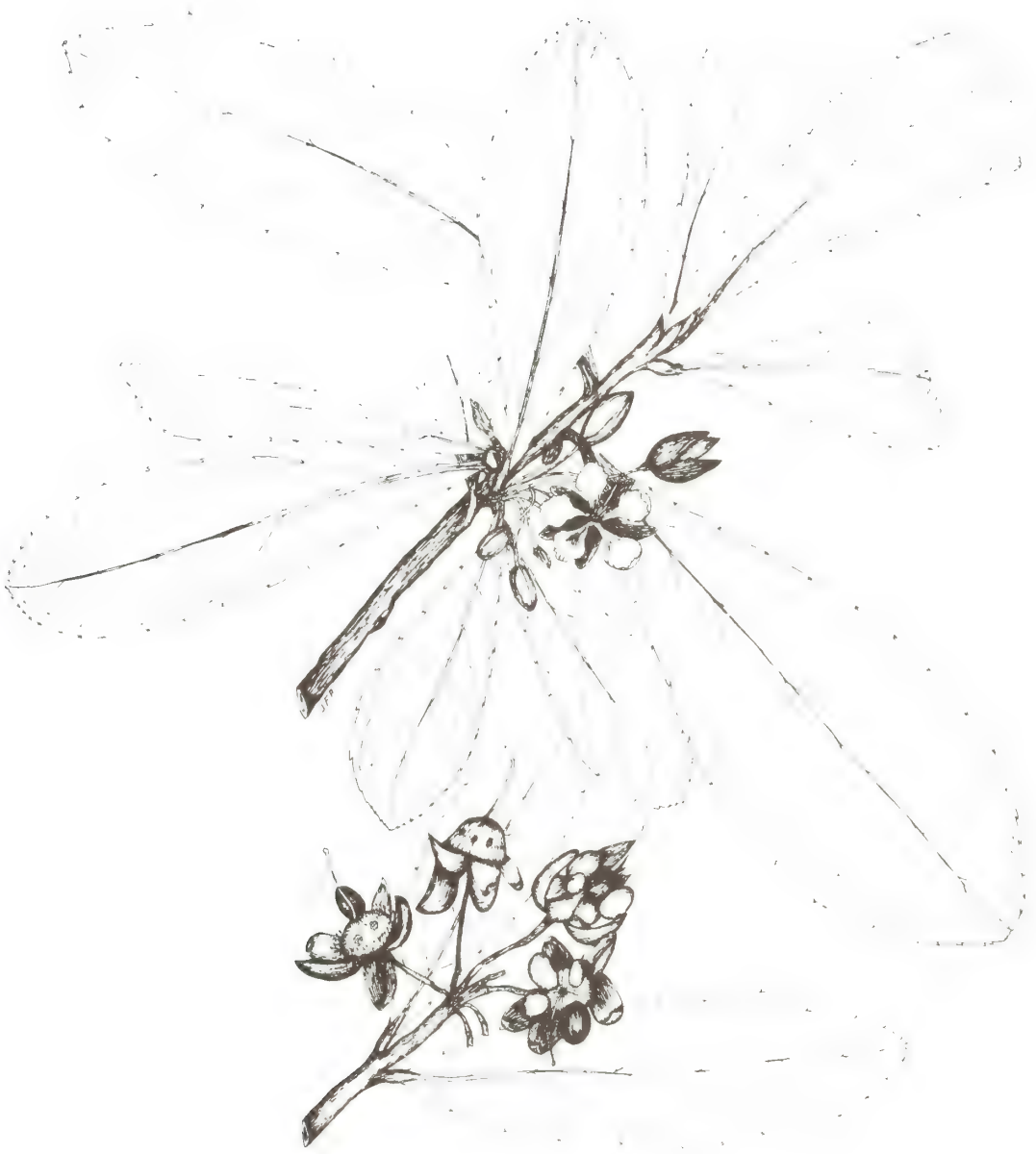
A planted evergreen shrub or small tree to 16 feet high and 4 inches in trunk diameter, reported to become a medium-sized tree where native. Flowering when a shrub of 4 feet.

Leaves alternate, hairless, 2–5 inches long and ¾–2 inches wide, gradually narrowed toward long-pointed base and short petiole less than ¼ inch long. The blades are slightly thickened, the shiny upper surface with many fine curved side veins all slightly sunken, and the lower surface slightly shiny.

The flowers at leaf bases consist of a slender jointed stalk of ½–1 inch; 5 narrow spreading sepals; 5 bright yellow stalked petals, falling early; many stamens; and pistil with deeply 5-lobed ovary and slender style. From a flower 5 or fewer elliptic black 1-seeded fruits (drupes) ⅜ inch long develop on an enlarged fleshy base with persistent style and red sepals.

Uncommon as an ornamental in Puerto Rico.

RANGE.—Native of Mozambique but planted uncommonly in other tropical regions.



507. Mozambique ochna ? *Ochna mossambicensis* Klotzsch*

Flowering twig (above), fruits (below), two-thirds natural size.

508. ***Ouratea ilicifolia* (DC.) Baill.**

This small tree is easily recognized by: (1) elliptic leaves with several large spiny teeth on wavy margins; (2) several showy flowers about 5/8 inch across the 5 rounded bright yellow petals, which shed early; and (3) fruits of 5 or fewer blackish or bluish elliptic drupes 3/8 inch long from the enlarged rounded red base.

Evergreen small tree to 15 feet high and 3 inches in trunk diameter. Twigs hairless.

Leaves alternate, with petioles 1/8 inch long. Blades 1 1/2–2 3/4 inches long and 3/4–2 inches wide, sharp-pointed at apex, straight or blunt at base, and with several large spiny teeth 1/8–1/4 inch long along margin, thick and leathery, shiny green, hairless.

Flower clusters (panicles) 2–5 inches long at leaf bases. The flower is composed of 5 narrowly elliptic sepals; 5 rounded yellow petals 1/4–3/16 inch long, narrowed at base, spreading, shedding early; 10 short-stalked stamens, with large anthers opening by pores; and on the enlarged base the pistil with ovary deeply 5-lobed, 5-celled, and 5-ovuled, and erect style. From one flower the base enlarges and becomes 1/4 inch across and red. There are 5 or fewer elliptic blackish or bluish 1-seeded fruits from a flower. Flowering and fruiting irregularly.

Local and uncommon in dry and moist coastal and lower Cordillera forests near sea level along northern, northeastern, and southeastern coasts of Puerto Rico. Also Vieques, St. Thomas, and Virgin Gorda. Not listed by Britton and Wilson (*10*).

RANGE.—Cuba, Hispaniola, and Puerto Rico and Virgin Islands.

OTHER COMMON NAMES.—chicharrón, chicharrón amarillo (Dominican Republic); rascabarriga (Cuba); arneau (Haiti). The specific name means holly-leaved.

508. *Ouratea ilicifolia* (DC.) Baill.

Flowering twig (left), fruiting twig (right), natural size.

509. Abey amarillo ***Ouratea littoralis* Urban**

This shrub or small tree known only from Puerto Rico and Virgin Islands is easily recognized by: (1) narrowly elliptic to ovate leaves finely and inconspicuously toothed, long-pointed, slightly thickened, with many fine, long, much curved side veins becoming nearly parallel with edge; (2) many fragrant yellow flowers ¾ inch across the 5 spreading petals, fan-shaped and notched, which shed early; and (3) distinctive fruits, 1–5 elliptic 1-seeded blue-black drupes 5/16 inch long on an enlarged fleshy red base ⅜ inch across.

Evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, hairless. Bark gray, smooth, becoming slightly fissured. Inner bark pink or light yellow, with a green outer layer, slightly bitter. Twigs yellow green and slightly angled when young, becoming brown.

The alternate leaves have paired narrow long-pointed stipules 3/16 inch long and short leafstalks ⅛ inch long. Blades are ½–4 inches long and ¾–1¾ inches wide, short-pointed or rounded at base, finely and inconspicuously toothed, especially toward apex, slightly thick and stiff, the sides slightly turned up at midrib, upper surface green and slightly shiny, lower surface dull yellow green.

Flower clusters (panicles) 2–5 inches long and broad at ends and sides of twigs bear many fragrant flowers on spreading branches. Each flower is composed of calyx of 5 pointed yellow-green sepals that form the bud ¼ inch long, 5 spreading yellow petals, fan-shaped and notched, which shed early, 10 short stamens, and on a disk the pistil with 5-lobed ovary and slender style. In fruit the rounded base or disk becomes much enlarged and red and bears 5 or fewer elliptic blue-black drupes with thin flesh, large stone, and elliptic seed. Flowering irregularly during the year.

The wood is whitish and hard.

Uncommon along eastern and northeastern coasts and other lowland open areas in moist coastal hills near sea level to about 100 feet altitude in Puerto Rico. White sands near Laguna Tortuguero 5 miles west of Vega Baja and to 1,000 feet altitude in Susúa Forest in southwestern Puerto Rico. Also St. Thomas and Virgin Gorda.

PUBLIC FOREST AND PARK.—Susúa; Gorda Peak.

RANGE.—Known only from Puerto Rico, St. Thomas, and Virgin Gorda.

OTHER COMMON NAMES.—abeyuelo amarillo, abeyuelo perfumado, doncella (Puerto Rico).

09. Abey amarillo *Ouratea littoralis* Urban

Flowers (upper left), fruits (center left), twig with flower buds (right), natural size.

510. ***Ouratea striata*** **(v. Tiegh.) Urban**

This shrub or small tree rare and local in high mountains of Puerto Rico is identified by: (1) the lance-shaped shiny leaves with a few long curved fine side veins over many fine parallel veins, slightly thickened and turned under slightly at edges; (2) few yellow flowers ½ inch across the 5 bright yellow petals; and (3) distinctive fruits, 1–5 elliptic and deep blue, nearly ¼ inch long, on the enlarged fleshy red base of a flower.

Evergreen shrub or small tree to 15 feet high and 6 inches in trunk diameter, hairless throughout. The bark is brown and smoothish, the inner bark light brown and almost tasteless. Twigs are green and slender when young, turning brown.

The alternate leaves have petioles ⅛–⅜ inch long. Blades are 1½–4 inches long and ⅝–1¼ inches wide, long- or short-pointed at apex and rounded or short-pointed at base, the upper surface green to dark green and shiny, and the lower surface yellow green to green and slightly shiny.

Flower clusters (panicles) 1–2 inches long at and near ends of twigs. Flowers few on stalks ⅛–¼ inch long, composed of 5 pointed sepals that form bud 3/16 inch long; 5 yellow petals ¼ inch long, shedding early; 10 stamens; and pistil with 5-lobed 5-celled ovary, and curved style. The fruits from a flower are 1–5 blue drupes, each with 1 large seed, attached to the red enlarged rounded or fig-shaped base. Flowering intermittently.

The sapwood is whitish and hard.

Rare and local in upper Luquillo and upper Cordillera forests and dwarf forest at 2,500–4,000 feet altitude in high mountains of Puerto Rico. Collected by the Forest Service in Carite Forest in 1940 and in the dwarf forest on Cerro de Punta in 1950. This species was not listed from Puerto Rico by Britton and Wilson (*10*).

PUBLIC FORESTS.—Carite, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba (Oriente) and Puerto Rico.

OTHER COMMON NAME.—guanabanilla (Cuba).

The Puerto Rican plants are referred to the Cuban species, which is not known from intermediate localities.

10. *Ouratea striata* (v. Tiegh.) Urban

Fruiting twig (above), flowering twig (lower left), natural size.

Trees and shrubs, known by: (1) alternate simple leaves usually leathery, evergreen, sometimes with lines parallel to midvein, without stipules; (2) flowers often large and showy and aromatic, generally solitary or few and lateral, bisexual, regular, often with 2 scales (bracts) at base, with calyx of 5–7 sepals usually separate, overlapping, and persistent, corolla of 5 petals commonly white or pink, separate or united at base, overlapping, many stamens often united to corolla in 5 opposite groups, and pistil composed of 2–5-celled ovary generally superior with 2 to many ovules in each cell and 2–5 persistent styles, often united at base; and (3) fruit usually a hard capsule with central persistent column, berry, or drupe. Also vol. 1, p. 346.

Key to species

A. Leaves only slightly thickened, with finely wavy-toothed edges; flowers nearly stalkless, almost 2 inches across; fruit a capsule splitting into 6–10 parts—160. Maricao verde, *Laplacea portoricensis* (Krug & Urban) Dyer.

AA. Leaves thick and leathery, with edges turned under; flowers stalked (except No. 516), less than 1 inch across; fruit a berry or opening irregularly.

B. Leaves with veins inconspicuous, often with minute teeth near apex; flowers with petals silky hairy on outside—511. *Cleyera albopunctata.*

BB. Leaves with veins mostly not visible, without teeth; flowers with petals hairless—*Ternstroemia.*

C. Flowers almost stalkless; leaves obovate, black-dotted beneath—516. *Ternstroemia subsessilis.*

CC. Flowers with stalks; leaves mostly elliptic, not black-dotted beneath (except No. 513).

D. Flower stalks less than ⅝ inch long.

E. Leaves 1–2 inches long; flowers ⅜ inch across—512. *Ternstroemia heptasepala.*

EE. Leaves 1½–4 inches long; flowers nearly ¾ inch across—515. *Ternstroemia stahlii.*

DD. Flower stalks more than ¾ inch long.

F. Leaves elliptic or obovate, about twice as long as wide, flowers about ¾ inch across—514. *Ternstroemia peduncularis.*

FF. Leaves elliptic or oblong, about 3 times as long as wide; flowers nearly 1 inch across—513. *Ternstroemia luquillensis.*

511. *Cleyera albopunctata* (Griseb.) Krug & Urban

This rare, usually small tree of high mountains is characterized by: (1) elliptic leaves 2–4 inches long and 1–1¾ inches wide, leathery, the upper surface dull dark green with edges turned under, and the lower surface light green; (2) narrowly bell-shaped flowers ⅝ inch long, with 5 whitish petals, 1–3 borne at base of a leaf; and (3) the elliptic dark red berry ½ inch long, ending in a long point, with greenish sepals at base.

An evergreen tree to 40 feet high and 1 foot in trunk diameter with compact dense crown, or smaller in dwarf forest of mountain summits. The bark is brown, smooth, covered with mosses and liverworts, the inner bark pinkish and slightly bitter. Twigs light green, hairless, becoming brown, ending in a narrow hairy pointed bud formed by a rolled young leaf without stipules.

Leaves alternate in 2 rows, becoming hairless, with stout light green petioles ¼–⅜ inch long, grooved above. Blades are blunt-pointed at apex, short-pointed at base, with edges turned under and often minutely toothed toward apex, with midrib sunken and veins inconspicuous.

The fragrant flowers are borne at leaf bases on separate light green stalks ⅜–¾ inch long, usually curved downward. The flower is composed of calyx of 5 overlapping dark green, thick, rounded or notched sepals ¼–⅜ inch long; corolla of 5 whitish or cream-colored elliptic petals ½–⅝ inch long, slightly united at base, finely silky hairy on outside, and minutely toothed; about 30 stamens ¼–⅜ inch long, attached to base of corolla; and pistil ⅜ inch long, with conic 3-celled ovary of many ovules, long style, and 3 short stigmas.

The berry ends in a long point formed by the style and is covered at base by the persistent overlapping sepals. It is thick-walled, slightly juicy, has few brown elliptic seeds ⅛ inch long, and does not split open. Flowers and fruits are borne through the year.

Rare in upper Luquillo and upper Cordillera forests and dwarf forest to ridges and peaks at 2,500-3,500 feet altitude. Ascends to summit of El Yunque, West Peak, El Toro, and perhaps others.

PUBLIC FORESTS.—Luquillo, Maricao.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAME.—copey vera (Cuba).

BOTANICAL SYNONYM.—*Eroteum albopunctatum* (Griseb.) Britton.

511. *Cleyera albopunctata* (Griseb.) Krug & Urban

Fruits (left), flowers (right), two-thirds natural size.

512. ***Ternstroemia heptasepala*** **Krug & Urban**

This shrub or small tree of dwarf forests of summits, known only from Luquillo Mountains, is distinguished from related species by: (1) the small thick elliptic leaves 1–2 inches long and $\frac{5}{8}$–1 inch wide, and (2) the small flowers about $\frac{3}{8}$ inch across the 5 whitish petals.

Usually a shrub to 10 feet high but becoming a small tree 25 feet high and 5 inches in trunk diameter, evergreen. The smooth gray bark is covered with mosses and liverworts, the inner bark pinkish and bitter. The twigs are brown or gray and hairless, relatively stout, ending in a minute pointed bud formed by a rolled young leaf, without stipules.

The leaves are alternate or sometimes opposite, hairless, petioles about $\frac{1}{8}$ inch long. Blades are elliptic, stiff and leathery, the apex rounded or blunt-pointed, the base short-pointed, the edges turned under, the upper surface dull dark green with midrib sunken and veins not visible, the lower surface light green.

Flowers are single or paired at leaf bases or back of leaves on curved light green stalks $\frac{3}{8}$–$\frac{5}{8}$ inch long. The fragrant flower is composed of calyx of 5 unequal rounded sepals $\frac{1}{8}$–$\frac{3}{16}$ inch long, greenish and tinged with brown; corolla of 5 obovate whitish petals $\frac{3}{16}$ inch long, united at base, minutely toothed on edges; about 25 stamens $\frac{1}{8}$ inch long attached to base of corolla; and pistil $\frac{1}{8}$ inch long, including rounded ovary, 2-celled with several ovules, and long stiff style. The egg-shaped fruit $\frac{5}{16}$–$\frac{1}{2}$ inch long, green when immature, has the narrow pointed style at apex and sepals at base. It is dry, 2-celled, few-seeded. Flowering intermittently.

The wood with light brown sapwood and brown heartwood is hard and heavy.

Rare in dwarf forest at 2,500–3,500 feet altitude on summits and ridges in Luquillo Mountains including El Toro and near East Peak.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquillo Mountains in northeastern Puerto Rico.

BOTANICAL SYNONYM.—*Taonabo heptasepala* (Krug & Urban) Britton.

The specific name means 7 sepals. However, the number is 5, as in related species, and 2 of the 4 outer bracts or scales less than $\frac{1}{8}$ inch long were included in the count.

512. *Ternstroemia heptasepala* Krug & Urban

Natural size.

513. Palo colorado ***Ternstroemia luquillensis*** **Krug & Urban**

This medium-sized tree known only from Luquillo Mountains reaches the largest size of the 5 native species of its genus, 4 of which are endemic to Puerto Rico. Distinguishing characteristics are: (1) elliptic or oblong leaves 2½–4½ inches long and 1–1¾ inches wide, thick and leathery; and (2) showy flowers nearly 1 inch across the 5 spreading white or cream-colored rounded concave petals, borne on long curved whitish stalks 1¼–3½ inches long.

An evergreen small or medium-sized tree 20–65 feet tall and 3–12 inches in trunk diameter, with narrow crown of dense foliage. Bark is dark gray and nearly smooth. The gray hairless twigs end in a minute pointed bud formed by a rolled young leaf without stipules.

The alternate hairless leaves have stout petioles ¼–½ inch long. Blades are blunt or short-pointed at apex, short-pointed at base, without teeth on edges, the upper surface dark green with midrib sunken and veins not visible, the lower surface light green with black dots.

Fragrant flowers are produced in large numbers, several on separate lateral stalks toward end of a twig, 1 or 2 at base of a leaf. There are 5 overlapping greenish white, rounded leathery sepals up to ⅜ inch in diameter, the inner largest, without glands on borders; corolla of 5 whitish or cream-colored petals ½ inch long and broad, united at base and slightly notched at apex; many stamens with pale yellow anthers, attached to base of corolla; and pistil with elliptic 2-celled ovary and long stiff style.

The fruit is an egg-shaped capsule with remains of style forming long point at apex and with overlapping rounded sepals at base. It breaks open irregularly, exposing several small bright red seeds more than ⅛ inch long. Collected with flowers in June and July.

Rare in upper Luquillo forest at about 3,000 feet altitude.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquilio Mountains of northeastern Puerto Rico, from which the scientific name was taken.

BOTANICAL SYNONYM.—*Taonabo luquillensis* (Krug & Urban) Britton.

513. Palo colorado *Ternstroemia luquillensis* Krug & Urban

Natural size.

514. ***Ternstroemia peduncularis* DC.**

This uncommon small tree of coastal thickets is characterized by: (1) thick, leathery elliptic or obovate leaves 1½–2¾ inches long and ¾–1¼ inches wide, rounded at apex; (2) flowers single on long curved stalks, about ¾ inch across the 5-lobed white corolla; and (3) rounded dry fruit about ½ inch in diameter, with narrow point at apex and rounded sepals at base.

Small evergreen tree or shrub to 30 feet high and 5 inches in trunk diameter. Bark gray, slightly fissured. Twigs gray, hairless.

Leaves alternate, clustered near end of twig, with petioles ¼ inch long, hairless. Blades narrowed to short-pointed base, turned under at edges, without visible side veins, the upper surface shiny green, the lower surface dull light green.

Flowers fragrant, single at leaf bases on long curved stalks ¾–2¾ inches long, turned down, composed of calyx of 5 overlapping rounded or blunt-pointed sepals less than ⅜ inch long; white corolla more than ⅜ inch long with 5 blunt lobes; many stamens inserted at base of corolla; and pistil with rounded 2-celled ovary and narrow pointed style. Fruit dry, hard, not opening, containing few seeds ¼ inch long. Flowering continuously.

Wood light brown, hard, used elsewhere in rural carpentry.

Local in coastal thickets near Fajardo and Humacao in eastern Puerto Rico from sea level to 400 feet altitude. Also St. Croix and St. John.

PUBLIC PARK.—Virgin Islands.

RANGE.—Cuba, Hispaniola, and Puerto Rico and Virgin Islands. Also through Lesser Antilles from St. Martin, St. Eustatius, and Nevis to Guadeloupe, Dominica, Martinique, and St. Lucia.

OTHER COMMON NAMES.—botoncillo (Dominican Republic); copey vera (Cuba); cacao de montagne, cacao de Grande Terre, bois vert (Guadeloupe); bois d'Inde marron (Haiti).

BOTANICAL SYNONYM.—*Taonabo peduncularis* (DC.) Britton.

14. *Ternstroemia peduncularis* DC.

Flowering twig (upper left), fruiting twig (below), natural size.

515. Mamey del cura ***Ternstroemia stahlii* Krug & Urban**

This tree known only from Puerto Rico is separated from related species by: (1) leaves and twigs both alternate and in whorls; (2) leaves obovate to elliptic, 1½–4 inches long and ¾–2 inches wide, thick, the apex rounded, sometimes slightly notched, the base gradually narrowed to short petiole; and (3) the flowers nearly ¾ inch across the 5 spreading white petals, the outermost of the 5 pointed sepals about ¼ inch long bordered with minute dotlike glands.

A small to medium-sized evergreen tree to 50 feet high and 10 inches in trunk diameter, sometimes much branched and shrubby. The bark is dark gray and smoothish, the inner bark pinkish and bitter. Twigs are gray and hairless.

The leaves, hairless and without stipules, have stout short petioles ⅛–⅜ inch long. The blades are thick and leathery and often stiff, with edges turned under slightly, the upper surface dull dark green or green with veins not visible, and the lower surface light green.

Flowers, often numerous, are borne singly at leaf bases on curved stalks ¼–½ inch long. The flower is composed of calyx of 5 pointed sepals about ¼ inch long, the outer 2 bordered with minute dotlike glands; corolla of 5 spreading white petals ¼–⅜ inch long, united at base; many stamens attached to base of corolla; and pistil with elliptic 2-celled ovary and long stiff style. The fruit is a rounded brown capsule ½ inch in diameter with point at apex and sepals at base. It splits open irregularly to release several bright red oblong seeds nearly ¼ inch long. With flowers and fruits through the year.

The sapwood is whitish and hard.

Local and scattered in moist coastal, moist limestone, lower Luquillo, and lower Cordillera forests from sea level to 2,800 feet altitude, including sandy coastal areas and mountains of Puerto Rico. Most abundant near Lake Toruguero.

PUBLIC FORESTS.—Guajataca, Luquillo, Maricao, Río Abajo, Susúa.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAMES.—palo de buey, cupeyillo (Puerto Rico).

BOTANICAL SYNONYMS.—*Ternstroemia pachyphylla* Krug & Urban, *Taonabo pachyphylla* (Krug & Urban) Britton, *Taonabo stahlii* (Krug & Urban) Britton.

The scientific name honors Agustín Stahl (1842–1917), physician and botanist of Bayamón, Puerto Rico, author of an unfinished flora of Puerto Rico (*74*).

515. Mamey del cura *Ternstroemia stahlii* Krug & Urban

Flowering twig (above), fruiting twig (below), natural size.

516. ***Ternstroemia subsessilis* (Britton) Kobuski**

A very rare shrub or small tree known only from Luquillo Mountains and Maricao Forest. Its distinguishing characters are: (1) obovate leathery leaves 1¼–3 inches long and ¾–1½ inches wide, turned under at edges and black-dotted beneath; (2) small flowers about ½ inch across the 5 white spreading rounded petals, almost stalkless at leaf bases; and (3) conic pointed dry fruits about ⅜ inch long, with 5 rounded sepals persistent at base.

Evergreen shrub 3–8 feet high or sometimes a small tree to 20 feet tall and 3 inches in trunk diameter, hairless.

Leaves alternate, hairless, with stout petioles ⅛–¼ inch long. Blades blunt or rounded at apex and short-pointed at base, the midvein sunken and side veins inconspicuous, dull green above, paler beneath.

Flowers solitary and almost stalkless at leaf bases. The calyx consists of 5 rounded overlapping sepals about ⅛ inch long, the outer smaller, lacking the glands found in related species. The 5 rounded concave white petals are about ⅜ inch long, and the style is 2-parted. The conical stalkless fruit tapers to a point.

Very rare in upper Luquillo and upper Cordillera forests at 2,500–3,000 feet altitude near summits of Luquillo Mountains and Monte del Estado.

PUBLIC FORESTS.—Luquilo, Maricao.

RANGE.—Known only from Puerto Rico.

BOTANICAL SYNONYM.—*Taonabo subsessilis* Britton.

This species was discovered in 1914 and named in 1924.

MANGOSTEEN FAMILY (GUTTIFERAE)

Trees and shrubs, sometimes epiphytes, strangling vines, and herbs, known by: (1) resinous sap or latex, white, yellow, or orange; (2) leaves generally opposite, simple, often succulent with fine parallel veins, mostly entire and hairless, sometimes with minute dots (*Vismia*), without stipules; (3) flowers often large and showy, in branched clusters (cymes), generally male and female and often on different plants (dioecious), regular, calyx of 2–6 (10) sepals often paired, 4–6 (12) petals usually white or greenish, sometimes succulent, many stamens separate or united at base or in groups, and pistil with superior ovary of 3–5 (1 to many) cells with 1 to many ovules and the same number of styles and stigmas (or no styles); and (3) fruit a fleshy capsule, berry, or drupe, with many seeds often with covering (aril). Also vol. 1, p. 348.

Key to species

A. Leaves stiff, ending in long-pointed sharp spine—165. Palo de cruz, *Rheedia portoricensis* Urban.
AA. Leaves thickened but mostly not stiff, apex short-pointed, rounded, or notched.
B. Leaves very thick and fleshy, with lateral veins inconspicuous or scarcely visible—*Clusia.*
C. Leaves stiff and turned under at edges, with stout flattened petiole.
D. Leaves with rounded or notched apex, petiole ½–1 inch long; seed capsules 2–2½ inches in diameter—163. Cupey, wild-mammee, copey clusia, *Clusia rosea* Jacq.
DD. Leaves with rounded apex, petiole about ⅛ inch long; seed capsules ⅝–¾ inch in diameter—162. Cupeíllo, *Clusia grisebachiana* (Pl. & Tr.) Alain (*C. krugiana*).
CC. Leaves less thick, not stiff and not turned under at edges, petioles ⅜–¾ inch long; seed capsules oblong, ¾–1 inch long—518. *Clusia minor.*
BB. Leaves slightly thickened, with many straight parallel lateral veins nearly at right angles to midrib.
F. Lateral veins only about 1/32 inch apart, fine and scarcely visible; fruit round, about 1–1¼ inches in diameter, inedible—*Calophyllum.*
G. Leaves 2½–5 inches long; fruits nearly 1 inch in diameter—161. María, santa-maria, *Calophyllum calaba* L. (*C. brasiliense*).
GG. Leaves 4–7 inches long; fruits 1¼–1½ inches in diameter—517. *Calophyllum inophyllum.**
FF. Lateral veins more than 1/16 inch apart; fruit nearly round, more than 2 inches in diameter, edible.
H. Leaves elliptic, rounded at apex; fruit nearly round, 3–6 inches or more in diameter with 2–4 large rough seeds (mamey)—164. Mamey, mammee-apple, *Mammea americana* L.
HH. Leaves oblong, pointed at apex; fruit 2–3 inches in diameter—*Garcinia.**
I. Leaves short-pointed, dull green; fruit elliptic, light yellow, with 1–5 seeds in sour pulp—519. *Garcinia dulcis.**
II. Leaves long-pointed, shiny green; fruit slightly broader than long, purple or brown, thick-walled, with 5–7 white edible segments, each enclosing a seed or none (mangosteen)—520. *Garcinia mangostana.**

516. *Ternstroemia subsessilis* (Britton) Kobuski

Fruiting twig (above), twig with buds (below), natural size.

517. Kamani ***Calophyllum inophyllum* L.***

This handsome introduced ornamental tree with cream-colored resinous sap or latex is identified by: (1) paired elliptic shiny dark green leaves, stiff and thick, with numerous very fine, nearly straight parallel side veins scarcely visible without a lens or until dried; (2) fragrant white flowers about 1 inch across, several in branched clusters at leaf base; and (3) fruits a few round balls 1¼–1½ inches in diameter, light green, becoming yellow or brown, containing 1 large round seed. Distinguished from its native relative, No. 161, maría, santa-maria, *Calophyllum calaba L.*, by the larger leaves and larger fruits.

An evergreen planted tree 45 feet high and 1 foot in trunk diameter, probably becoming somewhat larger at maturity, with spreading crown of irregular branches broader than high. The bark is light gray, smooth on branches, becoming slightly cracked into shallow broad furrows and long flat ridges. Inner bark is pink, fibrous, and bitter. Twigs stout, green, turning to brown, hairless, with cream-colored or light yellow resinous latex. Bud about ¼ inch long, narrow and pointed, dark brown, composed of minute leaves, without scales or stipules.

The hairless leaves are paired or opposite, in 4 vertical rows on a twig. The light green petioles are ⅝–¾ inch long, stout and flattened above. Leaf blades are 4–7 inches long, 2½–3½ inches wide, slightly notched at the rounded apex, rounded or blunt at base, slightly turned up from the yellow-green midvein and concave, with a narrow whitish line along the straight border, the lower surface yellow green and slightly shiny.

Flower clusters (racemes) 4 inches or less in length are borne at base of a leaf, usually only 1 on a twig. Several flowers on long stout stalks to 1½ inches long are composed of 4 rounded concave white sepals ¼ inch or more in length, in 2 pairs; 2–8 elliptic to oblong concave spreading petals ½ inch long; many stamens about 5/16 inch long, with orange anthers and white filaments slightly united at base; and pistil with round red 1-celled ovary containing 1 ovule, slightly curved style, and disk stigma. The fruit (drupe) has thin flesh and 1 large brown seed about 1¼ inches in diameter.

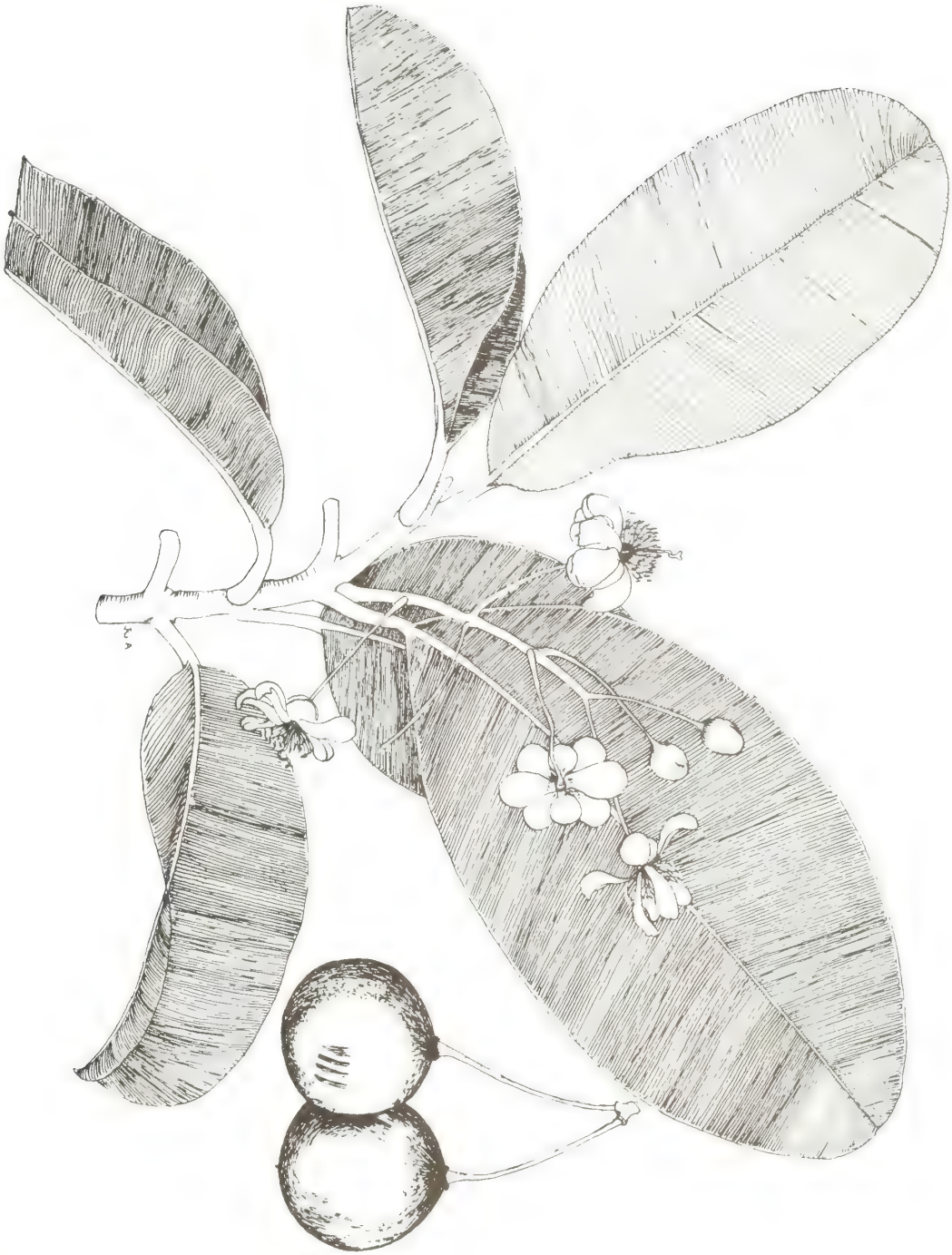
The wood, like that of the Puerto Rican relative, is utilized in the native home for general construction, cabinetmaking, boat-building, and similar purposes.

The latex or resin has served in home remedies, while the oil extracted from the seeds has been used in medicine and for light. Reportedly the seeds are poisonous. Regarded as sacred, this tree was grown around temples in the South Sea Islands.

A common street tree in Puerto Rico. Occasionally planted here and elsewhere in the tropics as an ornamental or shade tree for the dense shiny dark green foliage and fragrant flowers. Introduced in southern Florida. Slow growing.

RANGE.—Native of East Indian region of southeast Asia and Pacific Islands but widely planted through the tropics. Along shores in Hawaii.

OTHER COMMON NAMES.—kamani, Alexandrian laurel (Hawaii, United States); beautyleaf (United States).



517. Kamani *Calophyllum inophyllum* L.*

Flowering twig (above), fruits (below), two-thirds natural size.

518. Cupey de monte ***Clusia minor* L.**

A vinelike shrub or sometimes a small tree with long spreading branches and with whitish latex, further distinguished by: (1) paired thick and fleshy obovate leaves rounded at apex and long-pointed at base; (2) flowers with 5 spreading pale pink petals about 1 inch across, few in short terminal clusters, male and female on different trees (dioecious); and (3) oblong fleshy green capsules ¾–1 inch long.

Evergreen vinelike shrub with long paired horizontal or slightly drooping branches climbing on trees or a small tree to 20 feet or more in height and 5 inches in trunk diameter. Hairless throughout. The gray bark is smoothish or slightly fissured, the inner bark pinkish and slightly bitter, with whitish or cream-colored slightly bitter latex. The brown twigs are stout.

Leafstalks of the opposite leaves are ⅜–¾ inch long. The thick blades are 2–4 inches long and 1–2 inches broad, with veins only faintly visible, green to dark green on upper surface and yellow green beneath.

The terminal flower cluster a little more than 1 inch long is much shorter than the leaves. There are 4 whitish sepals 3/16–5/16 inch long and 5 widespreading large fleshy pale pink petals ½–⅝ inch long. Female flowers have a greenish 5-celled ovary with 5 dark brown stigmas and a brownish sticky mass at base and are slightly fragrant.

Seed capsules are green and fleshy, oblong or broadest above middle, ¾–1 inch long and ½–9/16 inch in diameter, with calyx at base and 5 stigmas at apex, splitting open into 5 parts to release the seeds 3/16 inch long. Sometimes the ovary and capsule are 6-celled. In flower and fruit through the year.

The whitish sapwood is soft.

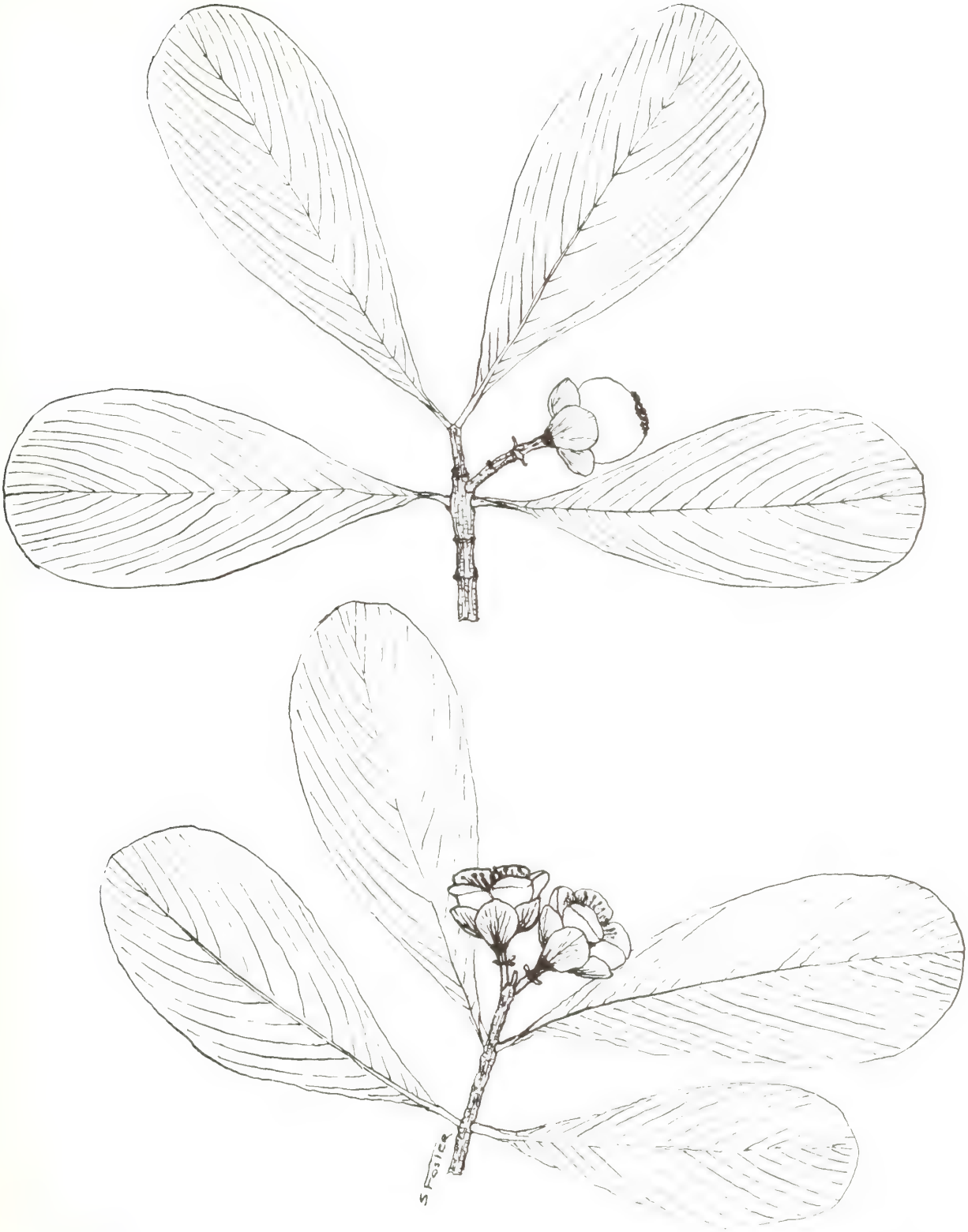
Local in lower and upper Luquillo and Cordillera forests at 600–4,000 feet altitude in mountains throughout Puerto Rico. Common locally on river banks, rocky areas, and peaks, becoming the dominant species in the upper part of Carite Forest.

PUBLIC FORESTS.—Carite, Guajataca, Luquillo, Maricao, Río Abajo, Toro Negro.

RANGE.—Cuba, Hispaniola, Puerto Rico, Dominica, St. Vincent, and Beguia in Lesser Antilles, and Trinidad and Tobago. Also in continental tropical America in Panama, Colombia, and Venezuela.

OTHER COMMON NAMES.—cupeíllo, cupey trepador (Puerto Rico); cupey, cupeyeto, cupey chiquito, copeito (Dominican Republic); copeicillo (Cuba); copey, copey chico (Panama); quiripito, copei, tampaco (Venezuela); figuier, figuier maudit (Haiti).

Cupeíllo de altura, *Clusia gundlachii* Stahl, is a vineline shrub or woody vine sometimes recorded as a tree but not so observed by the authors. It is identified by: (1) opposite, leathery or slightly fleshy, obovate to oblong leaves 2½–4½ inches long and 1–2 inches wide, mostly short-pointed at both ends, hairless, with inconspicuous veins, dark green above and paler beneath, with slender petioles of ¼–⅝ inch; (2) terminal clusters of many small flowers ⅜ inch wide, the female with 4 sepals, few pale pink petals, and pistil with 5-celled ovary and 5 flat stigmas; and (3) oblong or egg-shaped, light green fleshy seed capsule ⅝–¾ inch long, splitting into 5 parts. Common as a vine climbing on trees in moist forests including lower and upper Luquillo and Cordillera forests to high altitudes. RANGE.—Known only from Puerto Rico. OTHER COMMON NAMES.—bejuco de cupey, cupey de altura (Puerto Rico). This species honors Johannes Gundlach (1810–96), German zoology professor, who collected plants in Puerto Rico in 1875–76.



518. Cupey de monte *Clusia minor* L.

Fruiting twig (above), flowering twig (below), natural size.

519. Mangostán, mangosteen *Garcinia dulcis* (Roxb.) Kurz*

This rare introduced fruit tree related to the true mangosteen is identified by: (1) light yellow or whitish latex; (2) the slightly angled and flattened hairless green twigs with rings at nodes; (3) paired oblong leaves, stiff, thick and leathery, 4–12 inches long and 1½–5½ inches wide, dull green above and dull yellow green beneath; (4) few greenish white bell-shaped flowers about ⅜ inch long and wide on short stalks at leaf bases and back of leaves; and (5) elliptic fruit 2–3 inches wide, pointed, light yellow, with 1–5 seeds in pale orange or yellow sour pulp.

Evergreen fruit tree 20 feet high and 3 inches in trunk diameter, hairless throughout. Bark brown, smoothish to slightly fissured. Inner bark pinkish, brittle and bitter. Twigs ending in a growing point covered by petioles of last pair of leaves.

Leaves opposite, with stout greenish petioles ¼–1 inch long, flattened above. Blades are short-pointed at both ends, not toothed at edges, slightly turned up from the prominent midvein, with many fine inconspicuous side veins.

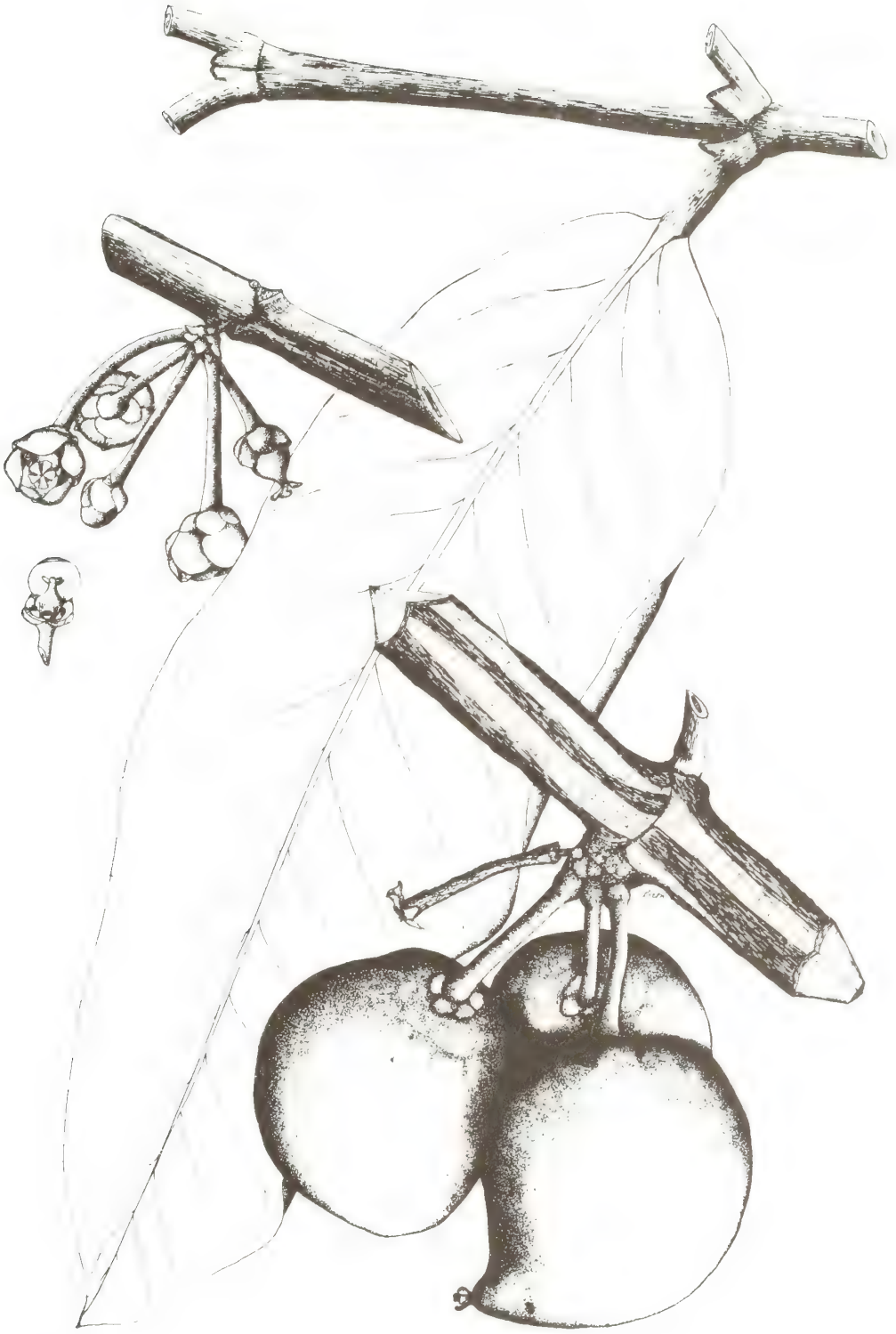
Flowers few on stalks about ½ inch long, composed of 5 unequal rounded light green sepals about 1/16 inch long and 5 unequal elliptic greenish white petals about ⅜ inch long, not spreading open. Male flowers have 5 stamens ¼ inch long. Female flowers have sterile stamens and on a disk the pistil with rounded green ovary ⅛ inch wide and broad flattened whitish 5-lobed stigma. The thin-skinned fruits have sour juicy pulp. Seeds 1–5, large, brown. With flowers and fruits in summer.

The sapwood is light brown and hard.

This fruit and ornamental tree has been introduced experimentally into Puerto Rico and is rare. The fruits are too sour to be eaten raw but may be candied and made into jam. Gamboge paint, of reddish yellow hue, has been made from unripe fruit.

RANGE.—Native from India to Malaya including Philippines.

OTHER COMMON NAME.—gourka (Hawaii).



519. Mangostán, mangosteen *Garcinia dulcis* (Roxb.) Kurz*

Female flowers (upper left), leafy twig, and fruits (lower right), two-thirds natural size.

520. Mangostán, mangosteen *Garcinia mangostana* L.*

Mangosteen is a popular Old World fruit grown only rarely in Puerto Rico. It is characterized by: (1) light yellow latex; (2) large paired, elliptic oblong leaves, thick and leathery, 6–10 inches long and 2½–4¼ inches wide; (3) flowers large, 1½–1¾ inches across the 4 rose-pink fleshy petals; and (4) rounded reddish purple or brown berry 2–3 inches long with 5–7 white segments somewhat like tangerine, the juicy sweetish edible pulp coverings around the seeds.

Small evergreen planted tree to 30 feet high and 6 inches in trunk diameter, with compact crown of nearly horizontal branches and shiny green coarse foliage, hairless throughout. Bark brown, thick, rough and irregularly fissured into small long plates. The light brown bitter inner bark yields light yellow bitter latex. Twigs stout, slightly angled, yellow green, with rings at nodes.

Leaves opposite, with stout yellow-green petioles ½–¾ inch long, flattened above, those of end pair covering the bud. Blades are long-pointed at apex, short-pointed or rounded at base, not toothed on edges, with many fine parallel side veins, the upper surface shiny green to dark green, and the lower surface dull yellow green.

Flowers of 2 kinds (polygamous) at ends of twigs, the bisexual flowers single or paired, composed of 4 rounded pink to red sepals in pairs; 4 fleshy rose-pink petals ¾ inch long and wide, broadest toward the rounded apex; stamens many, small and nonfunctional in female flowers; rounded ovary of 5–7 cells and ovules and broad 5–7-lobed stigma. Also male flowers 3–9 together at end of twigs on same tree.

The berry slightly broader than long has a hard smoothish rind and pink bitter inedible wall about ¼ inch thick, which exudes small drops of yellow latex when cut. Four enlarged concave light green or brown sepals remain at base. The edible part consists of 5–7 white segments (arils) about 1¼ inches long and ¾ inch wide, each enclosing a seed or none. The rounded flattened seeds are about ⅝ inch long. With flowers and fruits in summer.

Mangosteen is classed among the most delicious tropical fruits, having a flavor somewhat between that of a grape and a peach. Fruits are opened by cutting off the top half and exposing the segments. This fruit tree is cultivated sparingly in the tropics, mainly Old World. Growth is slow, and fruits are seldom borne before 8–15 years.

Mangosteen trees are planted experimentally in Puerto Rico but are rare, having been introduced in 1903.

RANGE.—Native of the Malay region but widely spread by cultivation.

OTHER COMMON NAMES.—mangostín (Puerto Rico, Spanish); mangosteen (English); mangostán (Spanish); jobo de la India (Dominican Republic).

520. Mangostán, mangosteen *Garcinia mangostana* L.*

Flowering twig, female flower (lower left), seed and fruit (lower right), two-thirds natural size.

TAMARIX FAMILY (TAMARICACEAE*)

Trees mostly small and shrubs of dry and salty areas, native of the Old World, known by: (1) very slender often drooping twigs; (2) leaves minute, scalelike, alternate, pressed against twig, without stipules; (3) minute flowers mostly crowded and short-stalked in unbranched clusters (racemes), bisexual, regular, composed of 4–5 sepals, 4–5 petals, stamens as many or twice as many as petals, and pistil with superior 1-celled ovary of 3–4 carpels and few to many ovules, 3–4 styles or none, and 3–4 stigmas; and (4) fruit a capsule with many hairy seeds.

521. Athel tamarisk ***Tamarix aphylla* (L.) Karst.***

Tamarisk, a rare introduced tree of dry areas, is easily recognized by: (1) drooping wiry gray-green twigs, jointed; (2) minute scale leaves 1/16 inch long, circling twig and ending in minute point; (3) many small whitish pink flowers less than 1/8 inch long in slender mostly branched clusters; and (4) seed capsules 3/16 inch long, splitting in 3 parts, with many tiny hairy seeds.

Evergreen small to medium-sized planted tree to 50 feet high and 2 feet in trunk diameter, with many spreading branches and rounded to irregular gray-green crown. Bark light gray brown or reddish brown, becoming thick and deeply furrowed into long narrow hard ridges. Inner bark light brown, slightly bitter. The branches are purplish brown and smooth. The wiry twigs less than 1/16 inch in diameter are gray green and mostly deciduous, the older twigs greenish brown.

The minute scale leaves are alternate, hairless, each forming a joint along twig, shedding together.

Flower clusters (racemes and panicles) mostly at ends of twigs, slender and 1¼–2½ inches long or branched and to 6 inches, bearing many nearly stalkless flowers. There are 5 overlapping rounded sepals, 5 petals less than 1/8 inch long and shedding early, 5 stamens attached between lobes of disk, and pistil with 1-cell ovary and 3 stigmas. Many narrow pointed seed capsules split into 3 parts. Each seed has a tuft of whitish hairs.

The wood is light brown and hard. Tests elsewhere indicate that it would be suitable for furniture and turned articles.

Rarely planted around houses in dry areas of Puerto Rico and the Virgin Islands. The trees grow rapidly, are drought resistant, and tolerant of alkaline and saline soils. Elsewhere used for windbreaks and hedges as well as shade.

RANGE.—Native from northern and eastern Africa to southwestern Asia. Widely planted in dry tropical and subtropical areas north to southern Texas, southern Arizona, and California.

OTHER COMMON NAMES.—athel, evergreen athel, desert athel, evergreen tamarisk (English).

BOTANICAL SYNONYM.—*Tamarix articulata* Vahl.

ANATTO FAMILY (BIXACEAE*)

Shrubs and small trees, known by: (1) orange sap in bark; (2) rings in nodes of twigs; (3) alternate simple leaves palmate-veined, entire, with stipules; (4) large showy flowers in terminal clusters (panicles), bisexual, regular, with 5 overlapping sepals, 5 large pink or whitish petals, many stamens with anthers opening by pores, and pistil with superior 1-celled ovary with 2 parietal placentas and many ovules, slender style, and 2 stigmas; and (5) fruit a spiny capsule that opens in 2 parts, containing many seeds with fleshy orange-red seed coat. Vol. 1, p. 358.

One species: 166. Achiote, anatto, *Bixa orellana* L.*

COCHLOSPERMUM FAMILY (COCHLOSPERMACEAE*)

Trees mostly small or sometimes large, shrubs, and herbs, known by: (1) alternate leaves simple and palmate-veined or digitate, with stipules; (2) large flowers in clusters (panicles or racemes), yellow or orange, bisexual, regular or slightly irregular, with 4–5 sepals and 4–5 petals, many stamens with anthers opening by pores, and pistil composed of superior ovary of 1 cell (or 3) and 3–5 placentas and many ovules, slender style, and 3–5 minute toothed stigmas; and (3) fruit a large capsule with thick outer wall and membranous inner wall, opening in 3–5 parts and containing many kidney-shaped seeds commonly hairy. Vol. 1, p. 360.

One species: 167. Rosa imperial, Brazilian-rose, cochlospermum, *Cochlospermum vitifolium* (Willd.) Spreng.*

521. Athel tamarisk *Tamarix aphylla* (L.) Karst.*

Flowering twig and fruits (lower right), natural size.

CANELLA FAMILY (CANELLACEAE)

Small and medium-sized trees, sometimes shrubs, known by: (1) leaves aromatic (also other parts), alternate, simple, entire, leathery, hairless, with gland dots, without stipules; (2) flowers small often in branched clusters (cymes) or solitary, bisexual, regular, with 4–5 thick overlapping sepals, corolla generally of 4–5 separate petals or none, 20 or fewer short stamens united by filaments in a tube around ovary, and pistil with superior 1-celled ovary with 2–5 placentas with 2 to many ovules, short stout style, and 2–5-lobed stigma; and (3) fruit a berry. Also vol. 1, p. 362.

Key to species

A. Leaves obovate or spoon-shaped, rounded at apex, 1¼–3½ inches long, leathery with indistinct veins; flowers several to many in branched terminal clusters with 5 dark red petals ¼ inch across—168. Barbasco, canella, *Canella winterana* (L.) Gaertn.

AA. Leaves elliptic, short-pointed, 3½–5 inches long, thin with many fine parallel side veins; flowers single at leaf bases with 12 white petals ¾ inch across—522. *Pleodendron macranthum.*

522. Chupacallos — *Pleodendron macranthum* (Baill.) v. Tiegh.

This distinctive aromatic tree is one of the very rarest in Puerto Rico. Its characters for recognition are: (1) elliptic leaves 3½–5 inches long and 1½–2¼ inches wide, short-pointed at both ends, with many fine parallel side veins; (2) large yellowish white flowers single at leaf bases, ¾ inch across, with 3 sepals, 12 petals, and many united stamens; and (3) rounded purple to black edible fruits ¾–1 inch in diameter, many-seeded.

An evergreen small or medium-sized tree to 40 feet high and 10 inches in trunk diameter, apparently aromatic. The brownish twigs are slender and hairless.

The alternate hairless leaves have petioles about ¼ inch long. Blades are not toothed on edges, the upper surface shiny green with midrib slightly sunken, and the lower surface dull green with midrib raised.

Flower stalks are about ½ inch long or to 1 inch on fruit. The flower has a yellowish white saucer-shaped fleshy calyx about ¼ inch across and ⅛ inch high, becoming slightly 3-lobed and turned back, persistent on fruit. The corolla is composed of 12 ovate to oblong yellowish white slightly thickened petals ½ inch long and 3/16–5/16 inch wide, rounded at apex, in 4 rows of 3 each. Stamens many, united into a tube ⅜ inch long. The narrow pistil ⅜ inch long inside tube has a 1-celled ovary with many tiny ovules, slender style, and 6 stigmas.

The fruits have calyx at base and short style at apex. They are purple to black, green when immature, aromatic, with odor described as like oranges. Seeds many, rounded, about ⅛ inch long, shiny brownish black. Collected with flowers in February and April-June and with fruits in June-August.

The wood is described as nearly white, hard, and heavy.

Very rare in forests in lower Luquillo Mountains and moist limestone regions. Reported from Guajataca and near Arecibo.

PUBLIC FORESTS.—Luquillo, Río Abajo.

RANGE.—Known only from mountains of Puerto Rico.

OTHER COMMON NAME.—acetillo (Puerto Rico).

This interesting tree honors its discoverer in its generic name meaning tree of Plée. The specific name describes the large flowers. First described in 1882, this tree was placed in its own distinct genus in 1899. Specimens were collected by foresters in 1938 and 1940 but not in recent years. A second species (*Pleodendron ekmanii* Urban), named in 1928, is a very rare small tree of mountains in Haiti.

August Plée (1787–1825), from France, collected plants in the Lesser Antilles and St. Thomas. He found this species while making a large collection in Puerto Rico in 1822–1823.

FLACOURTIA FAMILY (FLACOURTIACEAE)

Trees usually small or sometimes large and shrubs, known by: (1) leaves alternate in 2 rows, simple, usually toothed, sometimes with gland dots and lines (visible with lens against light); (2) flowers generally small or minute, green or white, many in branched clusters (cymes), usually bisexual, sometimes male and female, regular, with 2–15 sepals, 2–15 petals or none, many stamens, often with disk, and pistil composed of 1-celled ovary generally superior with 3–5 (2–10) parietal placentas with many ovules and 1–5 styles; and (3) fruit a capsule or berry (sometimes edible) with 1 to many seeds often with covering (aril). Also vol. 1, p. 364.

522. Chupacallos

Pleodendron macranthum (Baill.) v. Tiegh.

Natural size.

Key to species

A. Leaves with 3 or more main veins from base.
  B. Leaves with edges straight or minutely wavy-toothed; flowers whitish, 3/16 inch across, many nearly stalkless on narrow drooping axis—529. *Lunania buchii.*
  BB. Leaves with edges toothed.
    C. Leaves with 5 or 7 main veins from base; flowers yellowish, 3/8 inch across, few with long stalks—531. *Prockia crucis.*
    CC. Leaves with 3 main veins from base.
      D. Leaves hairless, with finely saw-toothed edges; flowers greenish, 3/8 inch broad, several on slender stalks—523. *Banara portoricensis.*
      DD. Leaves soft hairy beneath, with wavy-toothed edges; flowers yellow, more than 1/2 inch across, single at ends of side twigs—524. *Banara vanderbiltii.*
AA. Leaves with 1 main vein.
  E. Flowers in long-stalked lateral clusters; seed capsules resembling dried flowers with 6 or 7 large brown sepals attached—173. Caracolillo, *Homalium racemosum* Jacq.
  EE. Flowers at leaf bases, mostly short-stalked; fruit a seed capsule or berry, rounded or elliptic.
    F. Flowers yellowish, mostly male and female on different plants; berries more than 1/2 inch in diameter; uncommon introduced species.
      G. Leaves oblong; flowers about 1 inch across; fruits 1–2 inches in diameter, densely spiny, not edible—530. *Oncoba echinata.**
      GG. Leaves mostly ovate; flowers small, about 1/4 inch across; fruits less than 1 inch in diameter, edible.
        H. Leaves finely hairy on both surfaces, not toothed on edges—526. *Dovyalis hebecarpa.**
        HH. Leaves hairless, wavy-toothed on edges—527. *Flacourtia inermis.**
    FF. Flowers greenish or whitish, bisexual; fruits smaller; native species.
      I. Leaves soft hairy on both surfaces, gray green beneath; fruit dry elliptic, splitting open at top—532. *Samyda dodecandra.*
      II. Leaves hairless or nearly so; fruit a fleshy capsule or berry.
        J. Leaves thin, with gland dots and dashes visible with lens against light; fruit a fleshy capsule—*Casearia* (except No. 528).
          K. Leaves few, elliptic; seed capsules more than 1/4 inch in diameter.
            L. Spines scattered on twigs; seed capsule 1/4–5/16 inch in diameter, bright red—525. *Casearia aculeata.*
            LL. Spines absent; seed capsules about 3/8 inch in diameter.
              M. Leaves less than 3 inches long, hairless; seed capsules round—170. Tostado, wild honey-tree, *Casearia decandra* Jacq.
              MM. Leaves 2 1/2–5 1/2 inches long, hairy on veins; seed capsules elliptic—171. Palo blanco, wild-coffee, *Casearia guianensis* (Aubl.) Urban.
          KK. Leaves many, evenly spaced on long slender twigs, appearing pinnate.
            N. Leaves short-pointed at base, mostly lance-shaped.
              O. Leaves with lower surface gray green, hairy; edges finely saw-toothed—169. Rabo ratón, *Casearia arborea* (L. C. Rich.) Urban.
              OO. Leaves green on both surfaces, hairless; edges wavy and appearing as without teeth—172. Cafeíllo, *Casearia sylvestris* Sw.
            NN. Leaves rounded at base, oblong, hairless, with finely wavy border; seed capsules light green, 3/8–5/8 inch in diameter—528. *Laetia procera.*
        JJ. Leaves thickened, without gland dots; fruit a berry mostly red—*Xylosma.*
          P. Spines often much branched on branches and trunk; leaves elliptic.
            Q. Spines also single and unbranched at nodes on twigs; leaves mostly ending in spine—533. *Xylosma buxifolium.*
            QQ. Spines absent from twigs; leaves blunt at apex—534. *Xylosma pachyphyllum.*
          PP. Spines absent.
            R. Leaves obovate or oblanceolate, rounded or blunt at apex, slightly thickened—535. *Xylosma schaefferioides.*
            RR. Leaves ovate, long-pointed, thick and leathery, with prominent network of small veins—536. *Xylosma schwaneckeanum.*

523. Palo de ramón — *Banara portoricensis* Krug & Urban

Shrub or small tree rare in central mountains, identified by: (1) lance-shaped to ovate, long-pointed leaves with 3 or 5 main veins from base and with edges finely saw-toothed; (2) several greenish flowers on slender stalks, 3/8 inch broad, with 3-lobed calyx, 3 petals, and many stamens; and (3) fruit a rounded yellow or brown berry 3/8–1/2 inch in diameter.

Evergreen shrub or small tree to 35 feet high and 8 inches in trunk diameter, with irregular spreading crown. Bark brown, slightly fissured. Inner bark light brown, bitter. Twigs are brown, very slender, hairless, with many dots (lenticels).

Leaves alternate in 2 rows, hairless. Petioles slender, 1/4–1/2 inch long. Blades are 2–5 inches long, 1–2 1/2 inches wide, rounded or short-pointed at base, thin or slightly thickened, slightly shiny, the upper surface green to dark green with veins slightly raised, and the lower surface lighter green with raised veins.

523. Palo de ramón *Banara portoricensis* Krug & Urban

Fruiting twig (above), flowering twig (lower right), natural size.

Flower clusters (like racemes) at ends of twigs bear 5–10 flowers on long slender green stalks becoming ½–1 inch long, enlarged toward upper end. The flower has 3 rounded calyx lobes 3/16 inch long, 3 rounded green petals 3/16 inch long, very many stamens, and pistil with 1-celled ovary and many ovules attached on 6 lines and long-pointed style. The berry has enlarged calyx and corolla at base and pointed style at apex. Many shiny seeds 1/16 inch long are borne along 6 lines (placentas). Flowering and fruiting mainly in winter and spring, also in summer.

The wood is light brown and hard.

Rare in upper Cordillera forest and dwarf forest at 2,500-3,500 feet altitude in central Puerto Rico.

PUBLIC FORESTS.—Guilarte, Toro Negro.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAMES.—Caracolillo, tostado (Puerto Rico).

524. ***Banara vanderbiltii* Urban**

This very rare shrub or small tree known only from Puerto Rico is characterized by: (1) wavy-toothed elliptic or lanceolate leaves 1½–5 inches long and ⅝–2 inches wide, with 3 main veins from base; and (2) yellow hairy flowers solitary at ends of short side twigs more than ½ inch across the 3 pointed calyx lobes and 3 petals.

Evergreen shrub or small tree to 30 feet high and 5 inches in trunk diameter. Twigs slender, when young with dense spreading yellowish hairs.

Leaves alternate with small paired threadlike stipules and short hairy petioles about ¼ inch long. Leaf blades blunt or rounded and often slightly unequal at base, long-pointed at apex, wavy toothed, thin, with few curved side veins on each side and prominent beneath, the lowest pair parallel with margin, soft hairy on both surfaces, becoming rough and nearly hairless above.

Flowers solitary at ends of short side twigs on stalks ⅝–¾ inch long. Calyx about ¼ inch long, composed of 3 triangular hairy spreading lobes, persistent; petals 3, ¼–5/16 inch long, pointed, hairy, yellow; numerous spreading hairless stamens to 5/16 inch long; and pistil composed of rounded hairless 1-celled ovary with many ovules attached on 4 lines, slender curved style, and 4 minute stigmas. Collected with flowers in May. The fruits have not been described, but those of this genus are many-seeded berries.

Very rare in most limestone forests at about 300 feet altitude in Puerto Rico. First found near Cataño and Martin Peña and now known from only 2 trees on a farm near Bayamón.

RANGE.—Puerto Rico only.

This species honors Cornelius Vanderbilt (1843–1899), capitalist who financed the field work of the collector in Puerto Rico. Amos Arthur Heller (1867–1944), botanist from the United States, discovered this species near Cataño in 1899. Seeds of this endangered species should be collected for propagation in botanical gardens.

524. *Banara vanderbiltii* Urban

Natural size.

525. Cambrón ***Casearia aculeata* Jacq.**

This shrub or small tree of coasts of Puerto Rico is characterized by: (1) simple or branched spines $\frac{1}{4}$–$1\frac{1}{4}$ inches long usually scattered on branches; (2) elliptic leaves 2–4 inches long and $\frac{7}{8}$–$1\frac{3}{4}$ inches wide, short-pointed or blunt at both ends, inconspicuously wavy-toothed on edges, with minute dots and lines visible against the light with a lens, alternate in 2 rows and shedding in winter; (3) many small greenish-white flowers about $\frac{5}{16}$ inch across, clustered at leaf bases; and (4) round bright red seed capsules $\frac{1}{4}$–$\frac{5}{16}$ inch in diameter.

A deciduous shrub less than 12 feet, sometimes a small tree to 30 feet high and 4 inches in trunk diameter. The bark is light gray, smooth with warts (lenticels) and scattered spines. Inner bark is light brown and almost tasteless. The slender twigs are gray and finely hairy. Short twigs develop into spines.

The leaves have short finely hairy petioles $\frac{1}{16}$–$\frac{1}{4}$ inch long. Blades are thin, the upper surface green and hairless or nearly so, the lower surface pale green and hairy or nearly hairless.

Flowers several, fragrant, clustered at leaf bases on stalks less than $\frac{1}{16}$ inch long, consisting of calyx with 5 hairy lobes about $\frac{3}{16}$ inch long; 8 stamens alternate with 8 smaller sterile stamens (staminodes); and pistil with hairy 1-celled ovary, slender style, and rounded stigma. The seed capsules are slightly 3-angled and split into 3 parts. Seeds few. Flowering and fruiting intermittently through the year.

The sapwood is light brown and hard.

An uncommon understory shrub in moist and dry coastal and limestone forests from sea level to 300 feet altitude along coasts of Puerto Rico.

PUBLIC FOREST.—Cambalache.

RANGE.—Greater Antilles and continental tropical America from southern Mexico to Guianas, Brazil, Bolivia, and Peru.

OTHER COMMON NAMES.—rabo ratón (Puerto Rico); limoncillo (Spanish); palo de avispas, carambomba, margabomba (Dominican Republic); jía, jía brava, jía peluda (Cuba); punteral, cedrón (Mexico); escambrón, agua de árrea (Honduras); guacuco (Guatemala); matacartago (Costa Rica); espuela de gallo (Venezuela); clavillo (Ecuador); espina del demonio, supiecacha (Peru); wild lemon, lemonario (British Honduras); piquant arada (Haiti).

525. Cambrón *Casearia aculeata* Jacq.

Flowering twig (lower left) and fruiting twig, natural size.

526. Quetembila, kitembilla ***Dovyalis hebecarpa*** **(Gardn.) Warb.***

A shrub or small tree sometimes cultivated for its edible fruits. Identified by: (1) twigs often with long slender sharp gray spines to 1½ inches long at leaf bases; (2) leaves elliptic to ovate, 2–4 inches long and 1–1½ inches wide, often finely wavy-toothed on edges; (3) few greenish flowers about ⅝ inch across at leaf bases, male and female on different plants (dioecious); and (4) round purplish velvety hairy berries 1–1¼ inches in diameter.

Evergreen planted shrub or small tree to 15 feet high. The bark is gray, slightly scaly, the inner bark whitish and bitter. Twigs are long and slender, greenish gray, finely hairy.

Leaves are alternate in 2 rows, with pinkish hairy petioles about ¼ inch long. Blades are long-pointed at apex and rounded at base, thin, curved up slightly from midvein, pinnate-veined with 2 long curved lateral veins. The upper surface is shiny green with minute hairs, and the lower surface yellow green with pinkish veins and soft hair.

Male flowers many on short stalks, composed of mostly 4–7 hairy sepals, no petals, and many stamens on a fleshy disk. Female flowers 1 or few, consisting of 5–9 hairy sepals persistent on fruit and pistil with ovary of several cells and several styles. The fruit has styles at apex, purplish sour edible pulp, and several elliptic hairy seeds ¼ inch long.

The wood is light brown and hard.

Uncommonly planted in Puerto Rico for the fruits, which have an acid flavor like gooseberry and which are made into jelly. Tested also in southern Florida and Hawaii.

RANGE.—Native of India and Ceylon but introduced through the tropics.

OTHER COMMON NAMES.—Ceylon-gooseberry, ketambilla (English). The scientific name has been spelled *Doryalis* also.

526. Quetembila, kitembilla *Dovyalis hebecarpa* (Gardn.) Warb.*

Fruiting twig (left), flowering twig (right), two-thirds natural size.

527. Louvi ***Flacourtia inermis*** **Roxb.***

This shrub or small tree sometimes grown for its edible sour cherrylike fruits is identified by: (1) ovate to elliptic wavy-toothed leaves; (2) small yellowish flowers about ¼ inch long and broad, in short clusters at leaf bases, male and female on different plants (dioecious); and (3) round shiny cherrylike fruits, red, purple, or black, ½–1 inch in diameter.

A shrub or small tree to 30 feet or more in height, with light brown smoothish bark. The twigs sometimes have spines at leaf bases.

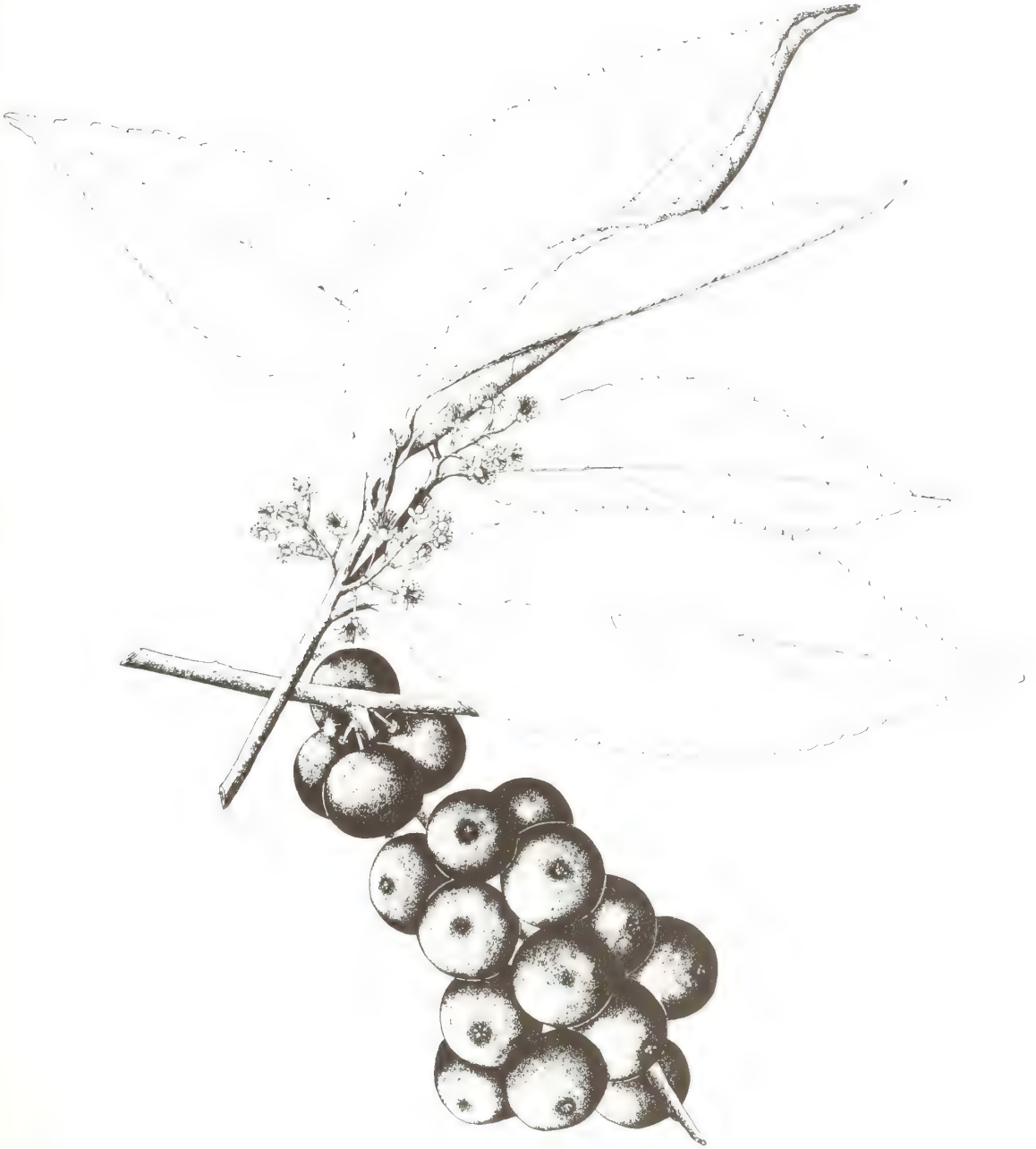
Leaves alternate, with petioles ¼–⅜ inch long. Blades are 2–8 inches long and 1–3½ inches wide, long-pointed at apex and short-pointed at base, thin or slightly thickened, becoming hairless or nearly so, the long curved side veins slightly sunken.

Several male flowers are borne on stalks of ¼ inch in short clusters (racemes) 1–1½ inches long, composed of 4–5 rounded hairy sepals more than 1/16 inch long, no petals, and many stamens. Female flowers few or single along twigs have pistil with 5-celled ovary and 5 short spreading styles. The fruits (drupes) are clustered along twigs mostly back of leaves, have remains of styles at apex, and contain 8–10 small seeds in juicy pulp.

Occasionally planted in Puerto Rico and the Virgin Islands for the fruits. Though very sour, the edible fruits make good jelly and preserves. The spiny variety has been used elsewhere in hedges.

RANGE.—Native of tropical Africa, southern Asia, and Pacific Islands to Philippines. Planted also in the New World tropics.

OTHER COMMON NAMES.—lovi-lovi, batoko-plum (English).



527. Louvi *Flacourtia inermis* Roxb.*

Flowering twig (above), fruits (below), two-thirds natural size.

528. Talantrón ***Laetia procera*** **(Poepp. & Endl.) Eichl.**

This rare tree in mountain forests is recognized by: (1) the leaves alternate in 2 rows on very long twigs, oblong, long-pointed, with finely wavy border and minute translucent dots and lines; (2) small greenish flowers, few on separate stalks at base of leaves; and (3) fruit a round fleshy capsule ⅜–⅝ inch in diameter, which opens in 3 parts and contains many seeds.

A medium-sized evergreen tree to 75 feet high and 1 foot or more in trunk diameter. Bark gray or greenish gray, smooth, with warts (lenticels). The interior bark is orange, streaked with yellow, with pink dots at surface, and with gritty taste. Twigs are brown, angular, and finely hairy. The buds less than ⅛ inch long are covered with stipules.

The leaves are alternate in 2 rows on long twigs, with slender petioles ⅜ inch long, grooved, light green. Leaf blades are 2½–6 inches long and 1¼–1¾ inches wide, thin, hairless, rounded at base, slightly turned up on both sides of midvein, the upper surface dark green and slightly shiny, the lower surface dull light green.

The flowers lateral at leaf bases have slender stalks ⅜ inch long. The flower is composed of calyx of 5 elliptic greenish sepals 3/16 inch long that become bent back; no corolla; many stamens more than 1/16 inch long; and pistil with rounded 1-celled ovary, many ovules on 3 lines, and short style. The seed capsules are fleshy and berrylike, light green, 1-celled, with calyx at base. There are many rounded black seeds less than ⅛ inch long. Collected with fruit in February, March, and December.

The wood is light yellow to orange, not differentiated into sapwood and heartwood, soft, and moderately heavy (specific gravity 0.75). Tested elsewhere, the wood was found to have commercial possibilities, being suitable for construction, veneer, and furniture.

Local in lower Luquillo forest at 1,500–2,000 feet altitude and in Central Cordillera near Utuado.

PUBLIC FOREST.—Luquillo.

RANGE.—Puerto Rico, Hispaniola, and northern South America from Colombia, Venezuela, Trinidad, and Guianas south to northern Brazil, Peru, and Ecuador. Also in Central America north to Nicaragua.

OTHER COMMON NAMES.—cotorrerillo, almendrillo, cuero de sapo (Puerto Rico); cascarudo, palo de yagua, palo verbena (Dominican Republic); jobo macho, caimite cimarron, cuajillo (Venezuela); marcelo (Ecuador); bois marie (French Guiana); warakajaro (Guayana, Surinam); basra kopie, pientokopie (Surinam); pau jacare, apijo (Brazil).

BOTANICAL SYNONYM.—*Casearia bicolor* Urban.

The Puerto Rican plants were given a separate name and afterwards united with this South American species.

28. Talantrón *Laetia procera* (Poepp. & Endl.) Eichl.

Flowering twig (above), fruiting twig (below), two-thirds natural size.

529. ***Lunania buchii* Urban**

This small tree rare in upper mountain forests is recognized by: (1) leaves ovate with 3 main veins from base, the 2 side veins curved almost to apex; (2) many minute white flowers on narrow drooping axis 4–8 inches long; and (3) dark brown rounded seed capsules $\frac{5}{16}$ inch in diameter, splitting widely in 3 or 4 parts.

Evergreen small tree to 20 feet high and 5 inches in trunk diameter. Bark gray, smooth or finely fissured, the inner bark light orange, slightly bitter. Twigs are slender, light green, becoming gray.

The leaves are alternate in 2 rows on slightly zigzag twigs, hairless. Petioles are slender, $\frac{1}{4}$–$\frac{5}{8}$ inch long. The blades are $2\frac{1}{2}$–4 inches long and $1\frac{1}{4}$–$1\frac{3}{4}$ inches wide, long-pointed at apex, rounded at base, with straight or minutely wavy toothed edges, slightly thickened and stiff. The 2 prominent side veins extend from base almost to apex, and 2 smaller side veins extend from midvein along border of base. The upper surface is green and slightly shiny, the lower surface dull light green.

The flowers about $\frac{3}{16}$ inch long and broad have stalk less than $\frac{1}{8}$ inch long; calyx of 2–3 rounded concave white sepals $\frac{1}{8}$ inch long, no corolla; 7–8 stamens on a disk; and pistil with 1-celled ovary, many ovules, and short style. The seed capsules bear many seeds of less than $\frac{1}{16}$ inch along 3 or 4 lines (placentas) in a fleshy mass. With flowers and fruits in spring and summer.

Wood whitish, slightly hard.

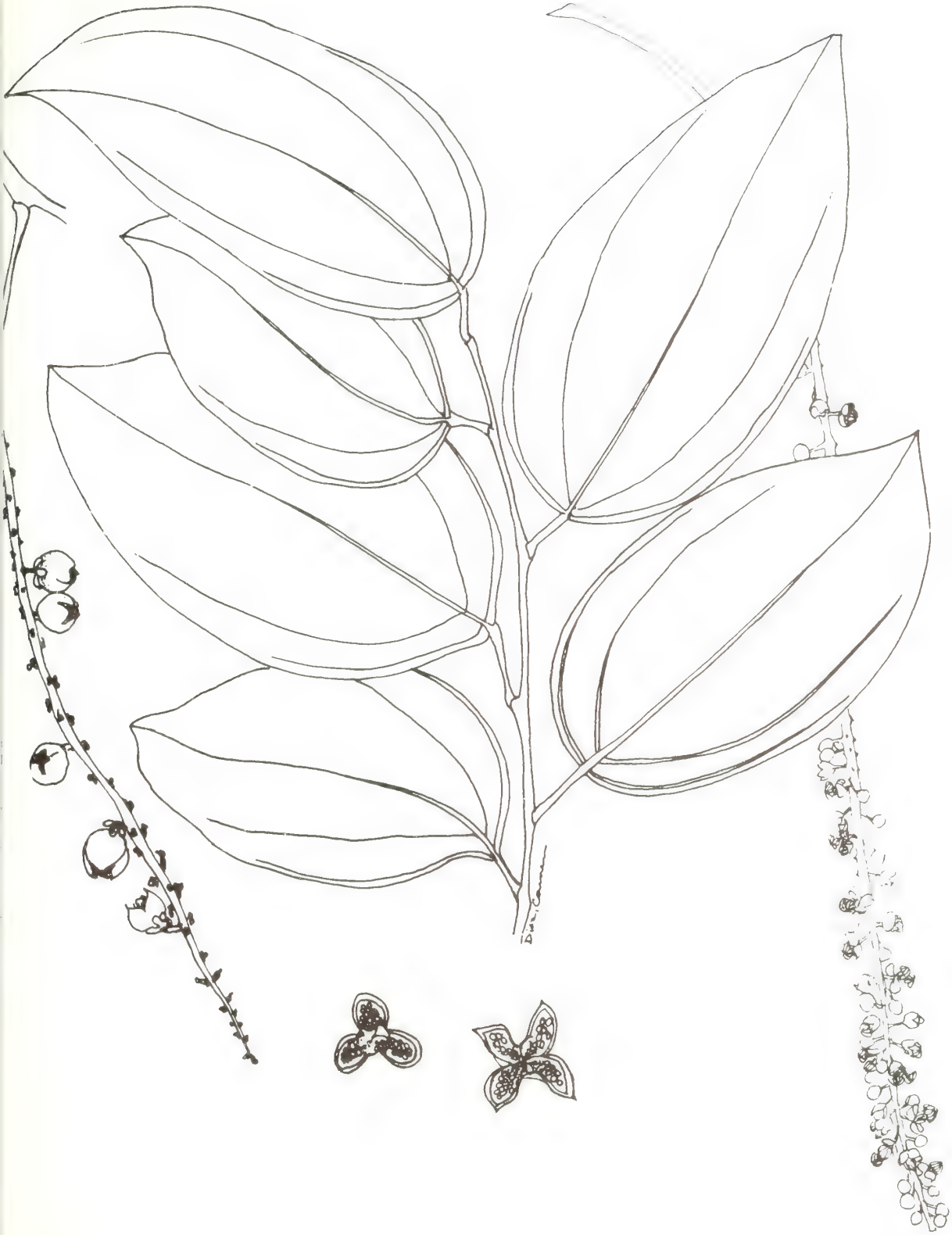
Rare in upper Luquillo and Cordillera forests at 1,500–2,800 feet altitude at El Verde and Maricao Forest.

PUBLIC FORESTS.—Luquillo, Maricao.

RANGE.—Puerto Rico and Hispaniola.

OTHER COMMON NAME.—mendrina (Dominican Republic).

This species (also genus) was not recorded from Puerto Rico by Britton and Wilson (*10*) but was found by the Forest Service in 1944. It was discovered in Haiti by Wilhelm Buch in 1930.



529. *Lunania buchii* Urban

Fruits (left), opened fruits (below), leafy twig (above), and flowers (right), natural size.

530. Gorli oncoba ***Oncoba echinata* Oliver***

This shrubby tree is sometimes planted as an ornamental. It is characterized by: (1) oblong leaves 4½–7 inches long and 1½–2½ inches wide; (2) few short-stalked flowers at leaf bases, about 1 inch across the spreading petals; and (3) fruit a rounded densely spiny greenish-yellow berry 1–2 inches in diameter, not edible.

An evergreen shrub or small tree, becoming hairless or nearly so. Leaves alternate in 2 rows, hanging down on petioles of less than ½ inch from long slender twigs. The blades are abruptly long-pointed at apex and rounded at base, not toothed on edges, thin, with few curved lateral veins, paler beneath.

Flowers are clustered on short stalks along twigs at leaf bases and back of leaves, partly of one sex and bisexual (polygamous), about 1 inch across. There are 3–5 sepals and 5–10 widely spreading narrow petals, very many short stamens, and pistil with spiny 1-celled ovary and slender style. The thick-walled berry is covered with many long spines ¼–⅜ inch long and contains 1 or few seeds in the pulp. Collected with flowers and fruits in January.

Introduced experimentally in Puerto Rico as an ornamental and medicinal plant. The seeds of this and related species contain chaulmoogric acid, used in the treatment of leprosy.

RANGE.—Native of tropical Africa but spread by cultivation.

OTHER COMMON NAMES.—gorli, katoupo (commerce).

530. Gorli oncoba *Oncoba echinata* Oliver[1]

Fruit (above), flowering twig (below), two-thirds natural size.

531. ***Prockia crucis* L.**

This shrub rarely treelike in size is identified by: (1) broadly ovate long-pointed saw-toothed leaves with 5 or 7 main veins from the notched base, with large long-pointed toothed stipules to 3/8 inch long; (2) few long-stalked fragrant small yellowish flowers about 3/8 inch across the 3 or 4 sepals and 3 or 4 petals; and (3) round black berries 1/4–5/16 inch in diameter.

A much-branched shrub observed treelike to 15 feet high and 2 1/2 inches in trunk diameter, recorded (perhaps elsewhere) as sometimes a tree to 33 feet, evergreen or perhaps deciduous in dry areas. The slender twigs are hairless or finely hairy.

The alternate leaves have very slender petioles 1/4–3/4 inch long. The thin blades are 1 1/4–4 1/2 inches long and 3/4–2 1/2 inches wide, sometimes larger, hairless or finely hairy, paler beneath.

Flower clusters (racemes or corymbs) are terminal, 4 inches or less in length. The flowers on long stalks of 3/8–1 1/4 inches consist of 3 or 4 pointed hairy sepals nearly 1/4 inch long, 3 or 4 short hairy yellowish petals that fall early, very many short threadlike stamens on a disk, and pistil with 3–5-celled ovary, many ovules, and slender style. The berries with calyx at base and style at apex are juicy and slightly sweet and contain many minute seeds. Collected with fruits in summer.

The wood is described as whitish, of medium hardness, and brittle.

Uncommon at low altitudes near Aguirre and Cayey in Puerto Rico. Also Vieques, St. Croix, St. Thomas, and St. John.

PUBLIC PARK.—Virgin Islands.

RANGE.—Cuba, Hispaniola, Puerto Rico and Virgin Islands, and through Lesser Antilles from St. Martin, Saba and Antigua to St. Vincent, Grenada, and Tobago. Also widespread from southern Mexico, British Honduras, and Guatemala to Brazil and Argentina.

OTHER COMMON NAMES.—guasimilla (Cuba); cacho de novillo (El Salvador); sacha capul (Ecuador).

531. *Prockia crucis* L.

Fruiting twig, natural size.

532. Guayabilla ***Samyda dodecandra* Jacq.**

This large shrub rarely treelike is identified by: (1) long slender finely rusty to yellowish hairy twigs; (2) oblong to elliptic leaves alternate in 2 rows, short-stalked, finely saw-toothed on edges, soft hairy on both surfaces, and with minute gland dots visible with lens against the light; (3) white bell-shaped flowers about ½ inch long, nearly stalkless at leaf bases; and (4) elliptic seed capsules ¾–1¼ inches long, bright red within.

A deciduous large shrub mostly 6–12 feet high, observed treelike to 15 feet high and 2 inches in trunk diameter, reported to reach 20 feet.

The leaves have short hairy petioles about ⅛ inch long. The thin or slightly thickened blades are 1½–4 inches long and ¾–2 inches wide, mostly short-pointed at apex and rounded at base, beneath gray green with network of raised veins.

The fragrant slightly irregular flowers have bell-shaped hairy calyx with 4–6 unequal lobes white above and green below, no corolla, 8–12 stamens on calyx and united into a tube, and pistil with hairy 1-celled ovary, many ovules, slender style, and dotlike stigma. The fruits with calyx at base and pointed style at apex split open at top along 3–5 lines and contain many seeds. Flowering from winter to summer.

Common and widely distributed at low altitudes in Puerto Rico, especially in dry limestone forest. Also Vieques, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS, AND PARKS.—Estate Thomas; Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Cuba, Hispaniola, Puerto Rico and Virgin Islands, and from St. Martin, St. Barts, and St. Eustatius to Guadeloupe and Martinique. Also Trinidad, Bonaire, and Curacao.

OTHER COMMON NAMES.—banso, wild guave (St. Martin, St. Eustatius).

532. Guayabilla

Samyda dodecandra Jacq.

Flowering twig (above), fruiting twig (below), natural size.

533. ***Xylosma buxifolium* A. Gray**

Roseta is recognized by: (1) single, unbranched, slender, gray spines $\frac{1}{4}$–$\frac{1}{2}$ inch long at nodes above leaf scars on twigs (sometimes absent) and the branched gray to red spines 1–3 inches long on trunk; (2) small, stiff, thick, elliptic leaves, usually spiny-pointed; and (3) lateral clusters of small yellowish flowers $\frac{1}{8}$ inch long (male and female on different trees); and (4) small red to black berries $\frac{3}{16}$ inch in diameter.

An evergreen tree to 45 feet high and 1 foot in trunk diameter, usually smaller. The gray bark is smoothish or slightly rough. Inner bark is light brown and bitter. The twigs are gray.

The alternate leaves have very short leafstalks $\frac{1}{16}$ inch long. Blades are 1–$2\frac{1}{4}$ inches long and $\frac{1}{2}$–$1\frac{1}{8}$ inches broad, short-pointed at base, the edges turned under and sometimes with 1 or more small teeth near the short spiny point, hairless, the side veins inconspicuous, shiny green on upper surface and paler beneath.

Male and female flowers are borne on different trees (dioecious), on slender stalks $\frac{1}{8}$–$\frac{3}{16}$ inch long, 4–8 at base of a leaf in a cluster (umbel) less than $\frac{1}{2}$ inch across. The calyx consists of 4 or 5 sepals less than $\frac{1}{16}$ inch long; petals absent; 8–30 stamens less than $\frac{1}{8}$ inch long are borne on a fleshy disk; and the pistil with 1-celled ovary and style 2-forked near apex. The elliptic or rounded berries have 2–5 seeds. Flowers in spring and collected with immature fruits in July.

The sapwood is light brown and hard.

Local and uncommon in moist limestone and upper Cordillera forests at 100–2,800 feet altitude in western mountains of Puerto Rico. Also recorded by Britton and Wilson (*10*) from St. Croix and St. John. Found recently on Virgin Gorda.

PUBLIC FORESTS AND PARK.—Cambalache, Guajataca, Guánica, Maricao, Río Abajo, Susúa, Vega; Gorda Peak.

RANGE.—Cuba, Hispaniola, Puerto Rico and Virgin Islands, and St. Eustatius, Guadeloupe, and Marie Galante in Lesser Antilles.

OTHER COMMON NAMES.—mala mujer, mucha gente, roseta (Dominican Republic); hueso de costa, pega-pega (Cuba); attrape-sot (Guadeloupe); cockspur (St. Eustatius).

BOTANICAL SYNONYM.—*Myroxylon buxifolium* (A. Gray) Krug & Urban.

533. Roseta *Xylosma buxifolium* A. Gray

Twig with female flowers (above), branched spine from trunk (lower right), natural size.

534. ***Xylosma pachyphyllum*** **(Krug & Urban) Urban**

This uncommon shrub or small tree known only from western high mountains of Puerto Rico is identified by: (1) much-branched spines ½–1 inch long, dark brown but red when young, in scattered clusters on trunk and branches; (2) elliptic leaves 1½–3 inches long and 1–2 inches broad, thick and leathery, toothed in upper half toward the blunt apex, and short-pointed at base; and (3) rounded bright red berries 3/16 inch in diameter, single on short stalks at leaf bases.

An evergreen shrub or small tree to 20 feet high and 5 inches in trunk diameter. The bark is smoothish with warts (lenticels). Inner bark is pink and slightly bitter. Twigs are light brown and slender, hairless.

The alternate hairless leaves have short petioles less than ⅛ inch long. Blades have edges turned under slightly, with inconspicuous wavy teeth in upper half, the upper surface dark green and slightly shiny, and the lower surface light green. There are few fine, long curved veins parallel with lower edges.

Flowers several, crowded at base of leaf from greenish buds less than 1/16 inch long, not yet described. In this genus the small flowers are male and female on different trees (dioecious), without petals, with many stamens. The 4–5 broad hairy sepals 1/16 inch long and short style with 3 short divided stigmas remain on fruit. The berries are borne singly at leaf bases on slender green stalks 3/16–¼ inch long. Seeds few, 1/16 inch long. Flowering intermittently, collected with fruits in July and December.

The sapwood is hard and whitish.

Uncommon and local in serpentine forest at 2,000–3,000 feet altitude in western high mountains of Puerto Rico.

PUBLIC FOREST.—Maricao.

RANGE.—Known only from Puerto Rico.

BOTANICAL SYNONYM.—*Myroxylon pachyphyllum* Krug & Urban. The descriptive scientific name means thick leaf.

534. *Xylosma pachyphyllum* (Krug & Urban) Urban

Twigs with fruits (left and upper right), twig with flower buds (center right), and twig with old female flowers (lower right), natural size.

535. ***Xylosma schaefferioides* A. Gray**

The shrub or small tree found in Maricao Forest is identified by: (1) small obovate or oblanceolate leaves $\frac{3}{4}$–$1\frac{3}{8}$ inches long and $\frac{1}{4}$–$\frac{1}{2}$ inch wide, slightly thickened, rounded or blunt at apex, often finely wavy toothed on edges; (2) small yellow flowers $\frac{1}{8}$ inch across, clustered at leaf bases; and (3) round scarlet berries $\frac{3}{16}$ inch in diameter.

An evergreen shrub or small tree 10–13 feet high and 4 inches in trunk diameter, elsewhere recorded to 25 feet. Leaves alternate, with petioles less than $\frac{1}{8}$ inch long. Blades have short-pointed base and long fine side veins nearly parallel to edges.

Flowers male and female on different plants (dioecious), several at leaf bases spreading on equal stalks about $\frac{1}{4}$ inch long. The 4–5 yellow sepals are less than $\frac{1}{16}$ inch long, and there is no corolla. Male flowers have 10–20 stamens less than $\frac{1}{8}$ inch long. Female flowers have pistil with 1-celled ovary, very short style, and broad stigma. The berries have sepals at base and stigmas at apex.

Rare and local in serpentine forest at 2,000–2,500 feet altitude in western high mountains of Puerto Rico.

PUBLIC FOREST.—Maricao.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—hueso de tortuga (Cuba); white logwood (Jamaica).

BOTANICAL SYNONYM.—*Myroxylon schaefferioides* (A. Gray) Krug & Urban.

This species of the other Greater Antilles was not listed by Britton and Wilson (*10*) and was not collected by the authors. It was found in Puerto Rico by Alain Liogier in 1963.

535. *Xylosma schaefferioides* A. Gray

Twig with male flowers (upper left), twig with immature fruits (upper right), and twig with female flowers (below), natural size.

536. Palo de candela *Xylosma schwaneckeanum* (Krug & Urban) Urban

This rare vinelike shrub or small tree is known only from mountain forests of eastern Puerto Rico. It is characterized by: (1) ovate leaves 2–4½ inches long and 1¼–2 inches wide, thick and leathery, long-pointed at apex and with small teeth along edges, and with prominent network of small veins, the very young leaves reddish; (2) flowers small, white, about 3/16 inch across, few clustered at leaf bases; and (3) red egg-shaped berries ½–9/16 inch long at leaf bases.

An evergreen vinelike shrub or small tree 15–25 feet high and 3 inches in trunk diameter, with slender wandlike branches. The slender brown twigs are finely hairy when young, with raised dots (lenticels).

The alternate leaves have petioles ⅛ inch long. Blades are hairless or nearly so, rounded or slightly notched at base, the upper surface shiny dark green with sides curved up from sunken midvein, the lower surface green and slightly shiny.

Flowers are male, female, and bisexual on the same plant (polygamous), on short stalks ⅛–¼ inch long. There are 4–5 white rounded finely toothed sepals ⅛ inch long; no corolla; 40–70 stamens less than ⅛ inch long in male flowers, fewer in bisexual flowers; and pistil ⅛ inch long with 1-celled ovary and short, thick, much divided, spreading styles. The berries clustered at leaf bases have sepals and styles persistent. Flowering and fruiting intermittently.

Rare in lower and upper Luquillo and Cordillera forests at 1,500–3,000 feet altitude in eastern mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo.

RANGE.—Known only from eastern Puerto Rico.

OTHER COMMON NAME.—palo colorado (Puerto Rico).

BOTANICAL SYNONYM.—*Myroxylon schwaneckeanum* Krug & Urban.

This species honors its discoverer, Carl Schwanecke (1821–1916), German horticulturist, who was in Puerto Rico, Vieques, and St. Thomas from 1847 to 1850. His collections, some from Luquillo Mountains, contained fungi, mosses, and liverworts as well as seed plants.

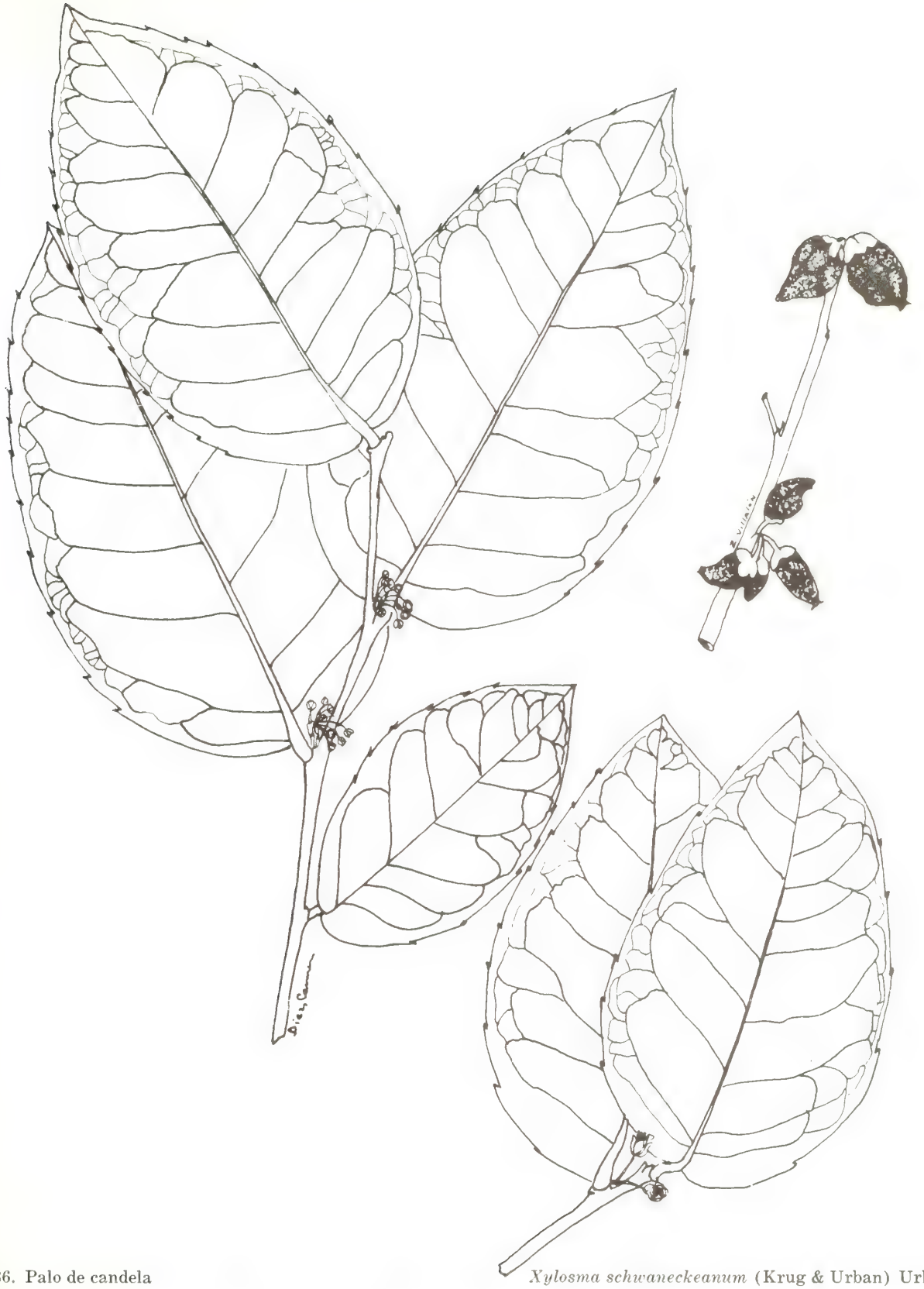
PAPAYA FAMILY (CARICACEAE*)

Trees or shrubs generally small and unbranched, sometimes large and branched, known by: (1) mostly aromatic trees with trunk often unbranched and stout, with milky sap in all parts and very soft lightweight wood; (2) leaves alternate with long petiole, simple, large and palmately lobed or digitate, without stipules; (3) flowers male and female on the same plant (monoecious) or different plants (dioecious) or bisexual, regular, white, sometimes large, few to many in clusters, composed of 5 small sepals, corolla with narrow tube and 5 lobes, 10 or 5 stamens inserted in tube, and pistil composed of superior 1-celled ovary with 5 parietal placentas with many ovules and 5 styles or stigmas; and (4) fruit a large elliptic berry like a melon with many rounded seeds with juicy covering. Vol. 1, p. 374.

One species: 174. Lechosa, papaya, *Carica papaya* L.*

CACTUS FAMILY (CACTACEAE)

Succulent spiny plants of dry areas (xerophytes), including herbs, shrubs, few small trees, epiphytes, and vines, known by: (1) succulent spiny plants, herbaceous or woody, with enlarged cylindric or flattened stems often jointed, with many clustered spines and hairs spreading from a center; (2) leaves reduced to scales or none or rarely alternate, simple, flattened, and succulent (*Pereskia, Pereskiopsis*); (3) flowers generally solitary, stalkless, large, bisexual, generally regular, slightly fleshy, with tube (hypanthium) above inferior ovary, many colored sepals and petals and intermediates, and very many stamens inserted in tube, the petals generally yellow, white, or pink, and pistil with inferior 1-celled ovary with 3 to many parietal placentas and many ovules, style, and 2 to many stigmas; and (4) fruit a spiny berry often juicy and edible, with many black seeds. Also vol. 1, p. 376.



536. Palo de candela *Xylosma schwaneckeanum* (Krug & Urban) Urban

Twig with male flowers (left), fruits (upper right), and twig with female flowers (lower right), natural size.

Key to species

A. Stems of many oblong flattened fleshy spiny pads or joints—*Opuntia.*
  B. Flowers ¾ inch across the spreading petals—176. Tuna de petate, pricklypear, *Opuntia rubescens* Salm-Dyck.
  BB. Flowers about 1 inch across the spreading petals—539. *Opuntia moniliformis.*
AA. Stems cylindric, with longitudinal ridges and grooves.
  C. Stems and branches with mostly 6 longitudinal ridges; flowers 8 inches or more in length, white—537. *Cereus hexagonus.**
  CC. Stems and branches with 7–12 longitudinal ridges.
    D. Stems mostly 1 trunk with several branches having 7–11 longitudinal ridges, with tufts of whitish hairs near apex; flowers 2 inches long, greenish, whitish, or purplish tinged; berries rounded but flattened, to 2 inches wide, red, spineless—175. Sebucán, dildo, *Cephalocereus royenii* (L.) Britton & Rose.
    DD. Stems several nearly erect from base and mostly unbranched, with 9–12 longitudinal ridges, without tufts of whitish hairs; flowers 4–5 inches long, whitish and pinkish; berries round, about 1¼ inches wide, red, spiny—538. *Lemaireocereus hystrix.*

537. Cacto columnar — *Cereus hexagonus* (L.) Mill.*

This tall columnar cactus is sometimes planted as an ornamental around houses, in hedges, and in parks. It becomes 20–30 feet in height, with trunk to 1 foot in diameter and few erect stout jointed branches. Distinguishing characteristics are: (1) stout gray-green branches 5–6 inches or more in diameter with usually 6 sharp angles and narrow ribs bearing clusters of several spreading brown spines ½–2 inches long in tufts of short gray hairs; (2) several to many large white night-blooming flowers borne singly and stalkless along branches, 8–10 inches long, composed of slender tube (hypanthium) of 4 inches bearing many narrow purplish green fleshy sepals and many narrow white petals 2½–3 inches long, very many threadlike white stamens, and pistil with cylindric inferior ovary 1 inch long, very long slender style, and many narrow stigmas; and (3) cylindric pale red berry about 4 inches long, containing white or pinkish edible pulp and many minute black seeds.

RANGE.—Native of Trinidad and Tobago and northern South America from Venezuela to Surinam. Introduced in Puerto Rico and the Virgin Islands and elsewhere through the West Indies and south to Brazil.

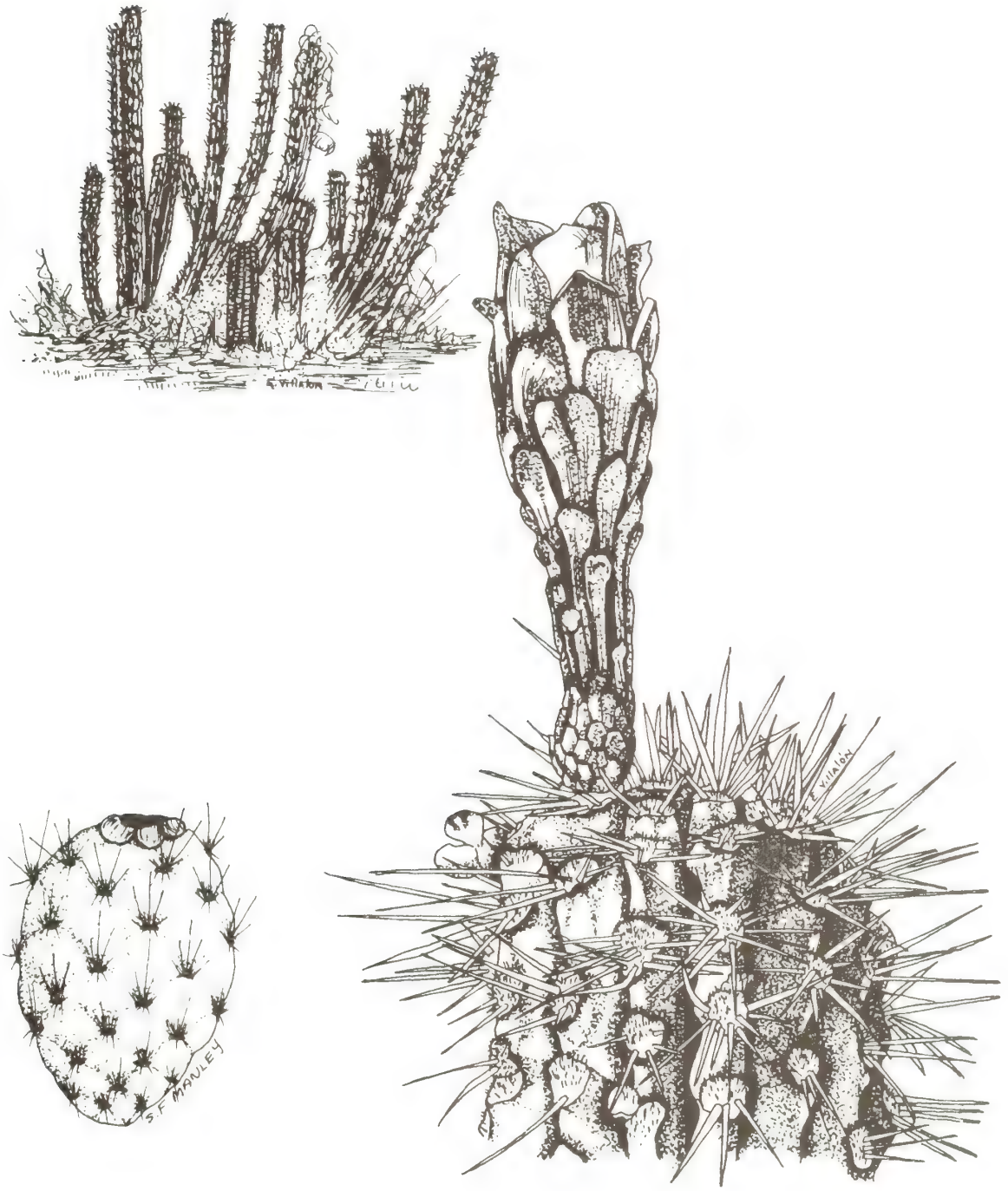
OTHER COMMON NAMES.—cayuco (Dominican Republic); cacto columnar (Cuba); reina de la noche (Venezuela); dama di anochi, lady-of-the-night (Dutch Antilles).

538. Dildo español, Spanish dildo — *Lemaireocereus hystrix* (Haw.) Britton & Rose

Dildo español or Spanish dildo is one of the organpipe cacti, so named from the resemblance of the clustered nearly erect, mostly unbranched, columnar stems to a pipe organ. Found in southwestern Puerto Rico and small dry islands, this treelike cactus is characterized by: (1) several thick, gray-green cylindric stems or trunks unbranched from the base or with few branches mostly 4–6 inches in diameter, composed of 9–12 longitudinal ridges or ribs and grooves; (2) leaves absent but replaced by spreading slender sharp gray spines ½–1½ inches long in clusters on ridges; (3) large funnel-shaped reddish flowers 4–5 inches long borne singly near ends of branches, with many spreading whitish and pinkish petals above the rounded spiny green ovary; and (4) fruit a round spiny red berry about 1¼ inches in diameter, juicy and edible.

Evergreen shrubby or treelike cactus mostly without a single trunk but with several nearly erect stout stems 10–15 feet high, sometimes to 25 feet, slightly spreading and curved up from base, often clustered and in colonies. These plants usually lack the single trunk and the crown of branches of trees but sometimes form a short trunk 1 foot high before branching. The stems, unjointed or with 1–3 constrictions, have 9–12 longitudinal ridges or ribs separated by grooves ½–¾ inch deep. The surface is smooth and gray green but becomes gray brown at base of older stems. The cut cross section consists of a dark green outer layer about ⅛ inch wide bordering the yellow-green or yellowish tissue, which is soft, watery, and bitter. Within is a ring of light brown hard wood about 2 inches in diameter and ⅛–¼ inch thick, and a large soft central pith. The rounded growing point at apex of the stems is covered by minute whitish hairs. At intervals of about ¾ inch along the ridges are raised points (areoles) bearing clusters of about 10 spreading gray spines.

Flower buds develop on ridges, 1–3 near apex of stem. The flower is composed of rounded inferior ovary about ½ inch in diameter, with scales and short spines; funnel-shaped tube 2–2½ inches long, purplish to dark



538. Dildo español, Spanish dildo *Lemaireocereus hystrix* (Haw.) Britton & Rose

Fruit (lower left) and branch with flower (right), natural size.

green; sepals many, fleshy, greenish; petals whitish and pinkish, about ½ inch long; very many white stamens; and pistil with slender white style. The fruits have reddish pulp and break open irregularly to release many black seeds. Flowering in spring and summer and maturing fruits in summer.

Plants have been grown elsewhere as fences and hedges.

Locally common on dry limestone and coastal hills from sea level to 300 feet altitude in southwestern Puerto Rico and small islands, including Mona, Desecheo, Muertos, and Cayo Norte of Culebra.

PUBLIC FOREST.—Guánica.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico, also Mona, Desecheo, Muertos, and Cayo Norte of Culebra.

OTHER COMMON NAMES.—cayuco (Dominican Republic); cardón (Cuba); dildo, Spanish dildo (Jamaica); catastres (Haiti).

BOTANICAL SYNONYM. — *Cereus hystrix* (Haw). Salm-Dyck.

539. Tuna ***Opuntia moniliformis*** **(L.) Haw.**

This tree cactus of the group known as pricklypears or tunas is native of southwestern Puerto Rico and the small islands Desecheo and Mona and westward in Hispaniola. It is recognized by: (1) the single erect round spiny trunk on large plants; (2) many oblong flattened spiny gray-green fleshy pads or joints vertically oriented; (3) leaves minute and replaced by many clusters of sharp slender gray spines; (4) flowers few, mostly erect on edges of pads, 1½–1¾ inches long, with many petals orange red or sometimes yellow on narrow cylindric spiny green ovary; and (5) cylindric or pear-shaped spiny green to red berry fruit about 2¼ inches long.

Evergreen cactus, shrubby or becoming a small tree 15–20 feet high with single erect trunk, not jointed, 3–6 inches, sometimes 10 inches, in diameter and several spreading branches composed of oblong gray-green spiny pads. Trunks smoothish gray, covered with spines, but in age the surface and spines shedding and replaced by a thin layer of brown bark. The cut cross section consists of a very thin light green layer about 1/32 inch thick, a soft almost tasteless yellowish tissue about ¼ inch thick, and a yellowish hard woody cylinder ¼–½ inch thick with large oblong vertical holes, and central pith.

The large oblong leaflike pads or joints are 6–12 inches long, 3–4 inches high, and ¼–⅜ inch thick, spreading horizontally or slightly curved upward, with the edge vertical. From many raised points (areoles) about ⅜–½ inch apart and corresponding to nodes are borne singly the minute awl-shaped green fleshy leaves, which shed early, and afterwards clusters of spreading slender sharp gray spines mostly ⅜–¾ inch long (sometimes a few to 2½ inches or more). Upon death, the soft succulent pads weather to reveal a skeleton or network of light brown woody strands.

Flowers are borne singly, stalkless and mostly erect on edges of pads. The narrowly cylindric green spiny inferior ovary 1¼ inches high and ⅝ inch in diameter is fleshy, 1-celled, and contains many ovules. It bears the other parts, many fleshy sepals, many petals about ½ inch long and spreading 1 inch across, mostly orange red or sometimes yellow, very many stamens shorter than the petals, and a fleshy style with several spreading stigmas.

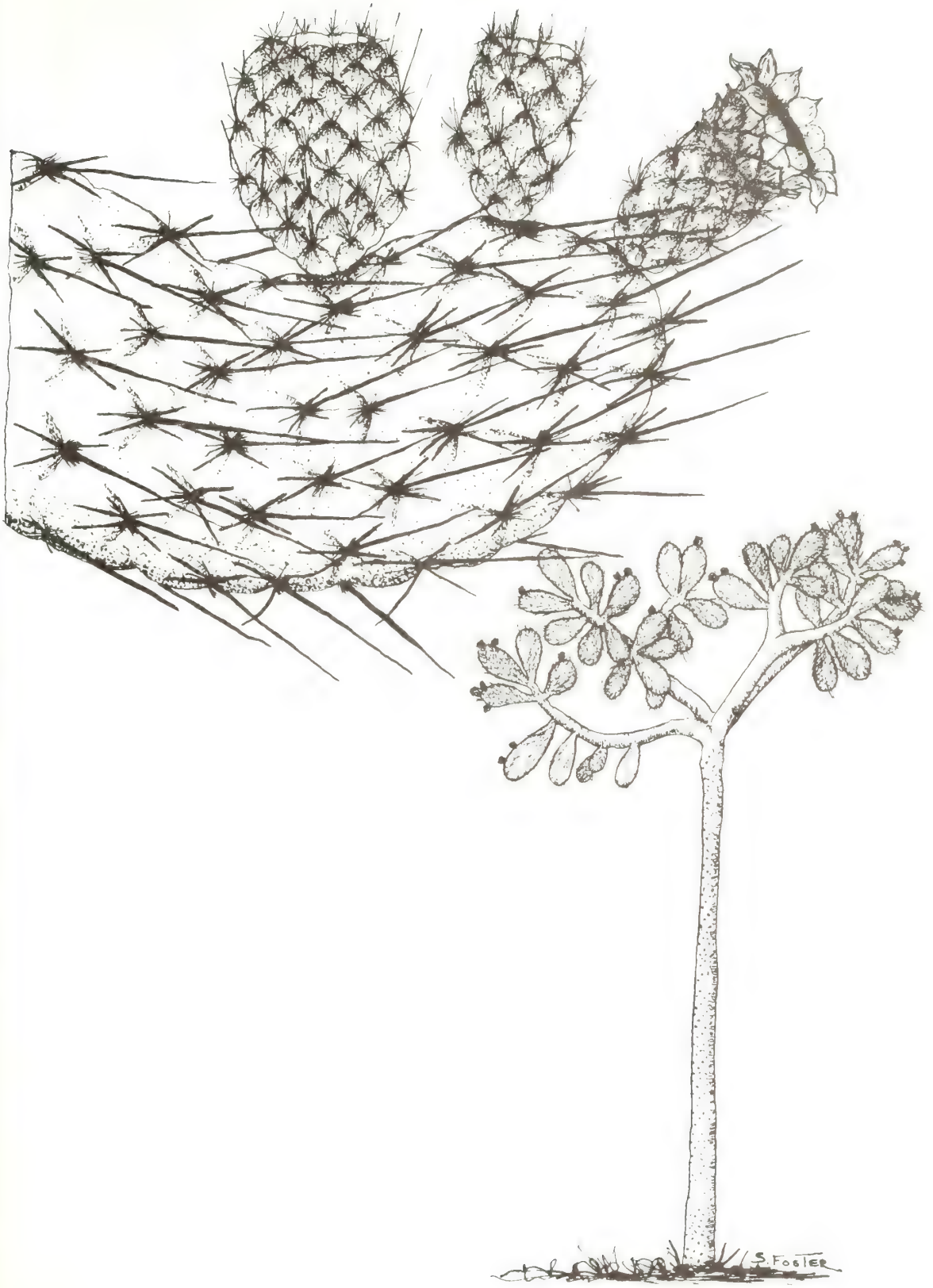
Green immature fruits 2 inches long and 1¼ inches in diameter often proliferate, producing a few smaller fruits end to end. These vegetatively-formed fruits, also small pads, break off easily, fall to the ground, and develop roots to produce new plants. Mature fruits are reddish, many-seeded, juicy, and edible. Flowering and fruiting intermittently, generally bearing flowers in spring and fruits in late summer.

Rare on rocky hillsides in dry forests in southwestern Puerto Rico and west on the small islands Desecheo and Mona, from sea level to 600 feet altitude.

RANGE.—Known only from Hispaniola, Puerto Rico, Desecheo, and Mona.

OTHER COMMON NAMES.—alpargata (Dominican Republic); patte tortue, raguette espagnole (Haiti).

BOTANICAL SYNONYM.—*Consolea moniliformis* (L.) Britton.



539. Tuna *Opuntia moniliformis* (L.) Haw.

Branch with fruits and flower (above), natural size.

MEZEREON FAMILY (THYMELAEACEAE)

Shrubs, woody vines, and mostly small trees, rarely herbs and large trees, known by: (1) opposite or alternate simple leaves, evergreen or deciduous, entire, without stipules; (2) small flowers in clusters (heads, umbels, or racemes), male and female on different plants (dioecious) or bisexual, regular, the base (hypanthium) and calyx narrowly tubular with 4–5 lobes, colored, usually without corolla, minute stamens double or equal to the number of lobes and inserted in tube, and pistil with superior 1-celled ovary and 1 ovule and short style; and (3) fruit a drupe or nut with 1 seed. Also vol. 1, p. 380.

Key to species

A. Leaves appearing opposite or in clusters of 3 or 4 (whorled); leathery and slightly fleshy—177. Majagua brava, *Daphnopsis philippiana* Krug & Urban.
AA. Leaves alternate, thin or slightly thickened.
B. Leaves hairless, ending in long blunt point—540. *Daphnopsis americana.*
BB. Leaves golden hairy beneath when young, abruptly short-pointed to blunt at apex—541. *Daphnopsis hellerana.*

540. Majagua de sierra, maho — *Daphnopsis americana* (Mill.) J. R. Johnst.*

This small tree is characterized by: (1) yellow-green lanceolate elliptic hairless leaves mostly 2½–6 inches long and 1–2¼ inches wide, long-pointed at both ends; (2) white or greenish white flowers about 3/16 inch long, several nearly stalkless in heads in terminal branched clusters, male and female on different trees (dioecious); and (3) elliptic white berries ¼ inch long.

Small evergreen tree to 25 feet high and 6 inches in trunk diameter, recorded to 50 feet high elsewhere. The bark is gray brown and smooth, fibrous. The slender twigs are light brown and finely hairy when young, becoming dark brown with many whitish dots (lenticels).

The alternate leaves have slender yellowish petioles ¼–⅜ inch long. The blades are thin or slightly thickened, ending in a long blunt point at apex, the margins with a yellow border, the upper surface yellow green and slightly shiny, with yellowish midrib, and the lower surface dull light green.

The flower clusters (headlike in panicles) are terminal, 1–2 inches long and broad, with short, finely hairy 2-forked branches ending in heads of several nearly stalkless hairy flowers. Male flowers about 3/16 inch long, composed of tubular hairy calyx about 3/16 inch long with 4 lobes; corolla a minute ring; 8 stamens on calyx, 4 on throat and 4 on lobes; and minute sterile pistil. Female flowers slightly smaller, composed of tubular hairy calyx ⅛ inch long with 4 short lobes; 8 sterile stamens; and pistil with conical ovary and short style. Fruit 1-seeded. Flowering and fruiting from spring through fall.

Elsewhere the fibrous bark has been used for rope and bridles.

Uncommon in moist limestone, coastal, lower Cordillera, and Luquillo forests at 100–3,000 feet altitude, especially on southerly slopes, widespread in interior of Puerto Rico. Also Vieques, St. Croix, St. Thomas, St. John, and Jost Van Dyke.

PUBLIC FORESTS AND PARK.—Cambalache, Guajataca, Guánica, Luquillo, Maricao, Río Abajo, Susúa, Vega; Virgin Islands.

RANGE.—This variable species containing several varieties or subspecies is found through the Greater and Lesser Antilles and from Mexico through Central America to Venezuela and Ecuador.

OTHER COMMON NAMES.—emajagua de sierra (Puerto Rico); maho (St. Thomas); guacacoa, guacacoa baría (Cuba); cuco, manca de torro (Mexico); coralillo blanco, camamán, mecabal, chilamatillo, capulincito, llovizna, chacachác (Guatemala); mancuno, mancume, pellejo de vieja (Nicaragua); mastate (Costa Rica); barbasquillo, pela manos (Colombia); sabanero (Venezuela); mahout pimente (Dominica); mahoe pimente (St. Vincent); burn-nose (Tobago); burn-nose tree (Jamaica); mahoe (St. Martin); mahot-piment (Guadeloupe, Martinique); mahout (Haiti); maho (Dutch Antilles).

The variation in Puerto Rico and the Virgin Islands has been designated as a subspecies (subsp. *caribaea* (Griseb.) Nevling, *D. caribaea* Griseb.), which occurs also through the Lesser Antilles and from Nicaragua to Venezuela.

540. Majagua de sierra, maho *Daphnopsis americana* (Mill.) J. R. Johnst.

Flowering twig (lower left) and fruiting twig showing fibrous bark, two-thirds natural size.

541. ***Daphnopsis hellerana*** **Urban**

This rare shrub or small tree known only from summits of limestone hills in northern Puerto Rico is characterized by: (1) twigs flexible and branching into 2 equal forks, golden hairy when young; (2) elliptic, oblong, or obovate leaves 1¼–6 inches long and ¾–2¾ inches wide, the lower surface golden hairy when young; (3) small golden hairy pale yellow or whitish flowers about ⅜ inch long, 3–5 at end of very young twig, male and female on different trees (dioecious); and (4) elliptic white berries ⅜–⅝ inch long and ⅜ inch in diameter.

An evergreen shrub or small tree becoming 15–20 feet high and 2 inches in trunk diameter, slender with few branches dividing into 2 equal forks. Bark gray, finely fissured, slightly thick and fibrous. Twigs stout, flexible, golden hairy when young but becoming nearly hairless.

Leaves alternate, few clustered at end of twig, with short petiole ⅛–¼ inch long. Blades abruptly short-pointed to blunt at apex, short-pointed at base, not toothed on edges, thin or slightly thickened, light green, the hairless upper surface sometimes drying to reddish brown, the paler lower surface golden hairy but becoming almost hairless, the side veins curved and prominent beneath.

Flower clusters (like umbels) terminal on very young twigs, golden hairy, with 3–5 flowers on stalks less than 1/16 inch long. Male flowers about ⅜ inch long, composed of tubular calyx golden hairy on outside and reddish and hairless within, with 4 spreading unequal narrow greenish-white lobes; 4 minute scalelike petals; 8 stamens inserted below mouth of tube; and sterile pistil. Female flowers smaller, composed of bell-shaped calyx less than ¼ inch long, golden hairy on outside and hairless within, with 4 unequal spreading lobes; 4 minute scalelike petals; 8 sterile stamens or none; and pistil with conical 1-celled ovary bearing 1 ovule and short style. The fleshy fruits are 1-seeded. Flowering intermittently, collected with flowers from February to April.

The wood is white and soft.

Rare on or near summits of limestone hills or mogotes at 80–500 feet altitude in moist limestone forest of northern Puerto Rico. Collected west of Bayamón, south of Dorado, and west to Guajataca Gorge near Quebradillas.

RANGE.—Known only from northern Puerto Rico.

Amos Arthur Heller (1867–1944), botanist of the United States, discovered this rare species near Bayamón in northeastern Puerto Rico in 1900. It was not collected again until rediscovered in 1958, as reported by Nevling and Woodbury (*63*).

Because of its rare and local occurrence, this species is classed as endangered. The plants bear fruits, which produce seedlings in nature. Some limestone hills are being leveled for building materials, while the natural vegetation of others is being destroyed or disturbed. Representative mogotes with their distinctive flora should be preserved.

541. *Daphnopsis hellerana* Urban

Natural size.

LOOSESTRIFE FAMILY (LYTHRACEAE)

Herbs, shrubs, and few tropical trees, known by: (1) leaves generally opposite or whorled, simple, mostly entire, without stipules or these minute; (2) flowers usually in branched clusters (cymes and panicles), bisexual, generally regular, with tubular or cuplike base (hypanthium) that bears on the border generally 4, 6, or 8 sepals and 4, 6, or 8 colored wrinkled petals with very narrow base, stamens double or equal to the petals and inserted within the tube, and pistil with superior 2–6-celled ovary generally with many ovules and style; and (4) fruit a capsule with many seeds. Also vol. 1, p. 382.

Key to species

A. Twigs sharply 4-angled with 4 or fewer short spines at nodes; flowers with 4 white petals about ½ inch across; seed capsules ¼ inch wide—542. *Ginoria rohrii.*

AA. Twigs not spiny (sometimes ending in spines in No. 544).

B. Flowers small, ⅜ inch across the 4 mostly whitish petals; seed capsules ¼ inch wide—544. *Lawsonia inermis.**

BB. Flowers large and showy, with 6 stalked mostly pink or purple petals.

C. Leaves 1–2 inches long; flowers 1¼ inches across; seed capsules about ½ inch wide—543. *Lagerstroemia indica.**

CC. Leaves 5–12 inches long; flowers 2–2½ inches across; seed capsules ¾–1¼ inches wide—178. Reina de las flores, queen-of-flowers, *Lagerstroemia speciosa* (L.) Pers.*

542. Rosa de ciénega — *Ginoria rohrii* (Vahl) Koehne

This shrub or small tree of coastal thickets is easily recognized by: (1) the young twigs 4-angled and bearing 4 or fewer short sharp spines less than ⅛ inch long; (2) opposite or whorled elliptic leaves 1¼–4 inches long and 1–2¼ inches wide, almost stalkless; (3) small flowers with 4 white petals about ½ inch across, on slender stalks at leaf bases; and (4) fruit a rounded capsule about ¼ inch long.

Shrub or small tree to 20 feet high and 4 inches in trunk diameter, with erect branches. Twigs light brown to light gray, hairless, with stipules at nodes represented by 4 spines in pairs, which extend down twig as 4 wings.

Leaves paired or in 3's, with short petioles less than ⅛ inch long. Blades are elliptic, short-pointed at both ends, with border not toothed, hairless, thin to slightly thickened, with many parallel lateral veins, the upper surface shiny green, and the lower surface shiny light green.

Several flowers are borne in clusters (umbels) or sometimes singly on slender stalks mostly ¼–½ inch long at leaf bases or when leafless. The flower is composed of calyx less than ¼ inch long deeply 4-lobed; corolla of 4 white petals ¼–⅜ inch long, elliptic and narrowed into stalk at base; about 20 threadlike stamens to ⅜ inch long; and pistil ½ inch long of rounded 3-celled ovary with numerous ovules, slender style, and dot stigma. The seed capsules split into 3 parts and contain numerous minute seeds. With flowers and fruits intermittently through the year.

The showy white blossoms have served as cut flowers.

Uncommon in thickets, especially along eastern and southern coasts of Puerto Rico to 100 feet altitude. Sometimes within salt zone along sandy coasts. Also Vieques, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FOREST AND PARK.—Aguirre; Virgin Islands. Reported from Guánica area.

RANGE.—Hispaniola (very rare) and Puerto Rico and Virgin Islands. Recorded also from St. Vincent.

OTHER COMMON NAMES.—ucarillo, cereza, serrazuela (Puerto Rico); sugar-ant (Tortola).

This species was named in 1792 for its discoverer, Julius Philipp Benjamin von Rohr (1737–1793), Danish surveyor and lieutenant in St. Croix for many years. He collected plant specimens also in Puerto Rico and northern South America.

542. Rosa de ciénega *Ginoria rohrii* (Vahl) Koehne

Flowering twig (left), fruiting twig (lower right), natural size.

543. Astromelia, crapemyrtle ***Lagerstroemia indica* L.***

Crapemyrtle resembles its close relative, reina de las flores or queen-of-flowers, No. 178, *Lagerstroemia speciosa* (L.) Pers.,* which has larger size, leaves, and flowers. This planted handsome ornamental shrub or small tree is recognized by: (1) mostly paired, nearly stalkless, small elliptic leaves 1–2 inches long on twigs slightly 4-winged; (2) terminal clusters of many showy flowers 1¼–1½ inches across the 6 rounded crinkled and wavy-margined spreading stalked petals, commonly pink but varying from white to red and purple; and (3) rounded seed capsules nearly ½ inch long, splitting into 6 parts.

This cultivated ornamental shrub or small tree is evergreen in tropical climates and deciduous in warm temperate regions. It becomes 20 feet high with a rounded spreading crown but begins flowering as a shrub. Usually there are several slightly angled trunks to 4 inches in diameter, with smoothish flaking mottled gray bark. Twigs are long and slender, reddish brown, slightly 4-winged, hairless or nearly so. Buds ⅛ inch long, narrow and pointed, reddish brown, covered by 2 hairy-margined scales.

Leaves opposite or paired or the upper ones alternate, appearing in 2 rows from bending of the short petioles 1/16 inch long, with 2 minute stipules. Leaf blades elliptic, 1–2 inches long and ½–⅞ inch wide, rounded at base and blunt-pointed at apex, not toothed on edges, thin, dull green above and paler beneath.

Flower clusters (panicles) at ends of slender twigs, 2½–6 inches long, bearing many showy odorless flowers on short stalks. Flower buds are rounded, ¼ inch wide, shiny green and reddish tinged. The flower has a half-round basal cup (hypanthium) ¼ inch long and ⅜ inch broad, green and reddish tinged, which bears 6 spreading pointed reddish-tinged sepals 3/16 inch long and 6 rounded crapelike petals, much crinkled and fringed, ⅜ inch long and broad on a slender stalk half as long, usually pink but varying from white to red and purple. Stamens of 2 sizes, 5 outer large colored more than ½ inch long and many ¼ inch long with yellow anthers. Pistil composed of round ovary less than ⅛ inch broad, 6-celled with many ovules, curved slender colored style ½ inch long, and dotlike stigma. Seed capsules brown, containing many small winged seeds. Flowering and fruiting from late spring to late fall.

Common as an ornamental in Puerto Rico and Virgin Islands but only in cultivation. Easily propagated by cuttings. The foliage is attacked by an introduced aphid (*Melanocallis*).

Crapemyrtle is a popular ornamental, much planted in tropical and warm temperate regions. From southeastern United States west to the Pacific Coast, it is grown widely around houses for its abundant summer flowers from July to September. Hardy north to Washington, D. C., and Baltimore. Propagated by cuttings.

RANGE.—Native of China and adjacent southeast Asia. Widely planted in tropical and warm temperate regions.

OTHER COMMON NAMES.—stromelia, astromero (Puerto Rico); júpiter, astromelia (Spanish); almira, astromera (Dominican Republic); astronómica (Mexico); crapemyrtle (English); common crapemyrtle (United States); stragornia (Haiti); queen-of-crib-flower, queen-of-the-garden, queen-of-flowers (Dutch Antilles); árvore de natal, minerva, extremosa, escumilha, norma (Brazil).

3. Astromelia, crapemyrtle *Lagerstroemia indica* L.*

Flowering twig (center), fruits (upper right), two-thirds natural size.

544. Resedá, henna ***Lawsonia inermis* L.***

Resedá or henna is widely planted for ornament and spreads from cultivation. This shrub or sometimes a small tree is identified by: (1) opposite elliptic or lance-shaped leaves ¾–2 inches long and ¼–¾ inch wide; (2) small excessively fragrant flowers ⅜ inch across the 4 white (sometimes pink or red) petals, many in terminal branched clusters; and (3) many round brown seed capsules ¼ inch long, opening irregularly.

An evergreen shrub or sometimes a small tree to 18 feet high and 4 inches in trunk diameter, much branched, hairless throughout. The slender twigs often end in spines.

The opposite leaves have short petioles 1/16–⅛ inch long, blades are short-pointed at both ends, not toothed on edges, thin, dark green.

Flower clusters (panicles) are 4–8 inches or more in length, much branched. Flowers on slender stalks ⅛ inch long, composed of 4-angled cup-shaped base (hypanthium) less than ⅛ inch long and broad, bearing 4 pointed sepals ⅛ inch long, 4 rounded wavy-edged wrinkled petals 3/16 inch long; and usually 8 spreading stamens 3/16 inch long. The pistil ¼ inch long consists of a round 2–4-celled ovary with many ovules and long slender style. The thin-walled seed capsule has sepals at base. Seeds many, 1/16 inch long and broad, angled, reddish brown. Flowering and fruiting through the year.

The reddish and yellowish dye henna, used for hair, is obtained from the leaves. Elsewhere, the roots, leaves, and flowers have served in home remedies. The drug lawsome is produced from this species.

This variable species is widely planted for ornament in Puerto Rico and Virgin Islands and is spreading. Hardy in dry areas. Also in Florida and southern California.

RANGE.—Native probably of northern and eastern Africa, western and southern Asia, and Australia. Widely cultivated and naturalized in West Indies and elsewhere in the tropics.

OTHER COMMON NAMES.—resedá (Spanish); resedá francesa (Cuba); amor fino (Peru); henna, mignonette-tree (English, United States); mignonette, Egyptian-privet (West Indies); réséda (French); miminet, reseda, henna (Dutch Antilles); copaie (Dominica).

The generic name honors John Lawson, surveyor-general of North Carolina, who in 1709 wrote an account of his travels and who was burned by the Indians in 1712. Though the specific name means spineless, the plants sometimes are spiny.

44. Resedá, henna *Lawsonia inermis* L.*

Natural size.

POMEGRANATE FAMILY (PUNICACEAE*)

Shrubs or small trees, known by: (1) leaves mostly opposite, simple, entire, without stipules; (2) large showy flowers solitary or clustered (like cymes), bisexual, regular, composed of long bell-shaped tubular leathery base (hypanthium), calyx of 5–7 thick pointed sepals, corolla of 5–7 petals rounded and short-stalked, many threadlike stamens inserted within tube, and pistil with inferior 3–7-celled ovary with cells in 2 series, many ovules, long style, and slightly enlarged stigma; and (3) fruit a round berry (pomegranate) with calyx at apex, several-celled, containing many angled seeds with watery sour edible pulp.

545. Granada, pomegranate — *Punica granatum* L.*

Granada, or pomegranate, a shrub planted for its edible fruit and for ornament, sometimes becomes a small tree. It is recognized by: (1) small leaves mostly opposite and crowded on short twigs, shiny, oblong, leathery; (2) large showy flowers mostly scarlet red, 1–1½ inches across the 5–7 rounded spreading petals; and (3) the familiar round fruit about 2½–4 inches in diameter, brownish yellow to red, containing many seeds surrounded by edible reddish or pink juicy pulp.

A deciduous shrub to 10 feet high or sometimes a small tree to 20 feet high, with several trunks to 3 inches in diameter. Twigs slender, often ending in spines.

The leaves are opposite or crowded, short-stalked, oblong or lance-shaped, 1–2½ inches or more in lentgh and ⅜–¾ inch wide, short-pointed or blunt at both ends or often with minute point at apex, not toothed on edges, hairless, thick and leathery, shiny green with reddish veins.

Flowers 1–5 clustered on short twig at leaf base, short-stalked. The bell-shaped tubular leathery base (hypanthium) encloses the rounded inferior ovary ½ inch in diameter and extends ¼–⅜ inch beyond, bearing the other parts. The calyx is composed of 5–7 thick pointed red sepals ⅜ inch long; the 5–7 petals, mostly 7, are about 1 inch long, rounded and short-stalked, red, yellow, or white, wrinkled; stamens many, threadlike, inserted within tube and spreading. The pistil has inferior 3–7-celled ovary with cells in 2 series, with many ovules, long style, and slightly enlarged stigma. It is reported that some flowers are male with nonfunctional pistil.

The granada or pomegranate fruit is a berry, with calyx and tubular base persistent at apex, with thick leathery skin, several-celled, the cells separated by membranous walls. Seeds many, angled, about ¼ inch or more across, with watery sour edible pulp.

A refreshing drink is made from the edible fruits. The root bark, twigs, and fruit rind have served in home remedies. The fruit rind has been used also for tanning and preparing a black ink. A honey plant.

Planted for fruits and ornament in Puerto Rico and the Virgin Islands and spreading. Propagated by cuttings. Many horticultural varieties have been developed for different purposes. Cultivated also across southern United States commonly in double-flowered horticultural forms not bearing fruit, and hardy north to Washington, D. C., and Baltimore. Trimmed as a hedge in California and recorded as naturalized in Florida. Dwarf small-flowered forms are grown in gardens and in greenhouses northward.

The bark of trunk and root formerly was official in medicine under the name granatum (pomegranate bark). The drug pelletierine tannate is obtained from the bark.

PUBLIC FORESTS.—Guánica, Susúa.

RANGE.—Native of southern Asia from the eastern Mediterranean to Himalayas. Long cultivated and naturalized in the Mediterranean region. Widely planted and naturalized through the tropics and subtropics. Hardy in dry climates.

OTHER COMMON NAMES.—granada, granado, granadero (Puerto Rico, Spanish); pomegranate (Virgin Islands, continental United States, English); grenade (French); pomegranate, granaatappel, granatapel (Dutch Antilles).

The scientific name is from the Latin word for Carthage, meaning the Punic apple and garnet or many-seeded.

545. Granada, pomegranate *Punica granatum* L.*

Flowering twig (left) and fruit (right), two-thirds natural size.

BRAZILNUT FAMILY (LECYTHIDACEAE*)

Trees, often large to very large, and shrubs, known by: (1) alternate simple leaves sometimes very large, generally entire, sometimes with glands on border, without stipules; (2) flowers usually large and showy in clusters (racemes and panicles), regular or irregular, bisexual, the persistent calyx of 4–6 lobes, corolla of 4–6 separate or united petals, very many stamens generally united and with staminodes from a disk in a ring and often oblique on a side or folded over, and pistil with inferior or partially inferior 2–6-celled ovary with 1 to many ovules and style; and (3) fruit hard and woody, often large and cuplike with thick walls, opening with a lid, or a berry, with many seeds sometimes edible.

Key to species

A. Leaves large, obovate, thick, shiny dark green; flowers large, whitish with brushlike stamens; fruit large, 4-sided—546. *Barringtonia asiatica.**

AA. Leaves narrowly elliptic, thin, green; flowers large, pink red or orange red; fruit resembling cannonball—547. *Couroupita guianensis.**

546. Coco de mar, barringtonia — *Barringtonia asiatica* (L.) Kurz*

Barringtonia, a rare introduced ornamental and shade tree, is easily recognized by: (1) the large obovate shiny, dark green leaves clustered at ends of relatively few large stout branches; (2) very large whitish flowers about 6 inches across the many spreading brushlike or threadlike stamens, opening singly in late afternoon from clusters of large light green buds at the ends of slightly drooping branches; and (3) the peculiar 4-sided dark brown fruit 3–3½ inches long and broad, slightly suggesting a small coconut.

Evergreen medium-sized planted tree becoming 30 feet high and 2 feet in trunk diameter or larger, hairless throughout. The open irregular broad crown has relatively few long stout spreading and slightly drooping branches. The bark is gray and finely fissured. Inner bark is whitish beneath a reddish outer layer, fibrous and bitter. The very stout twigs are light green when young, becoming gray, with large, slightly rounded, raised leaf scars. The bud is formed by a folded light green very young leaf, without scales or stipules.

The many large leaves are alternate, crowded, and stalkless, 12–18 inches long and 6–9 inches wide, thick and leathery, slightly notched at the rounded apex, broadest beyond middle, and gradually narrowed to the winged base, with straight edges. The upper surface is shiny dark green and slightly curved up from the yellow-green midvein, with few side veins, and the lower surface is dull light green.

Flower clusters (like racemes) up to 1 foot long bear several light green elliptic buds to 1½ inches long, on long stout curved stalks to 4 inches long. One flower opens in late afternoon and sheds its petals and stamens the next morning. The slightly fragrant flower is composed of 2 elliptic concave light green sepals 1¼ inches long, which remain at apex of fruit; 4 whitish elliptic petals 2–3 inches long, slightly concave and thickened; very many stamens 3½–4 inches long, the threadlike filaments white and purplish tinged toward the brown dotlike anthers, straight and spreading brushlike, slightly united at base into a ring and falling together the next morning; and pistil with inferior light green 4-sided, 4-celled ovary containing many minute ovules, stout straight style 4½–5 inches long, white but purplish tinged toward the dotlike stigma.

The hard heavy fruit has the 2 large brown sepals and base of style at the blunt apex, 4 rounded sides bluntly 4-angled, and a very thick corky fibrous husk. The large rounded brown seed about 2 inches in diameter germinates within the fruit, which does not open. Flowering and fruiting continuously.

Where native, the trunks have been used to make canoes. The fruits are made into fishnet floats. Bark, crushed fruits, and seeds have served as fish poison and in folk medicine.

A rare odd ornamental, apparently of slow growth, introduced into Puerto Rico about 50 years ago and sparingly planted. Also Mona.

Planted also in Hawaii. In southern Florida the trees are killed back by freezing temperatures.

This species grows naturally along seashores, forming beach forests. Its waterproof corky fibrous fruit is adaped to transport by water, somewhat like the coconut.

RANGE.—Native of tropical shores and widely distributed from islands of South Pacific Ocean and from Philippines to India. Occasionally planted in botanical gardens through the tropics.

OTHER COMMON NAMES. — barringtonia, showy barringtonia (United States); bonete

546. Coco de mar, barringtonia *Barringtonia asiatica* (L.) Kurz*

Fruit, leaf, and flower, two-thirds natural size.

de arzobispo, birrete de obispo, coco de Cofrecí, pacana (Dominican Republic); sea putat, butong (Asia); hutu (Tahiti).

BOTANICAL SYNONYM.—*Barringtonia speciosa* Forst.

This genus and related trees of the Old World tropics have been placed also in a separate family, barringtonia family (Barringtoniaceae).

547. Bala de cañón, cannonball-tree *Couroupita guianensis* Aubl.*

A botanical curiosity represented only by a few planted trees, which are recognized by: (1) strongly perfumed large pink-red or orange-red flowers spreading 4–4½ inches across the 6 large concave fleshy petals and bearing many stamens on a fleshy white central disk with top curved over itself; (2) brown heavy round fruits 4–8 inches in diameter resembling cannonballs; and (3) thin narrowly elliptic leaves, short-pointed at apex and rounded at base, with many parallel, slightly sunken lateral veins.

A large erect tree, deciduous or where native evergreen or nearly so, becoming 80 feet or more in height with straight trunk to 1 foot or more in diameter, with a narrow crown of few nearly horizontal branches. The bark is brown, smoothish and becoming slightly fissured. Inner bark is light brown, fibrous, and almost tasteless to slightly bitter. Twigs are green and slightly bristly hairy, becoming brown, with a reddish-brown pointed hairy terminal bud ¼ inch long.

Leaves are borne singly or alternate on yellow-green hairy petioles ⅜–¾ inch long. Blades often broadest beyond middle, 3½–8 inches long and 1¼–3¼ inches wide, turned up a little at midrib, slightly shiny on both sides, green above, and beneath light green and slightly hairy on veins.

Stout woody flowering branches (racemes) arise from the trunk, continue to elongate to 2–6 feet, rarely to 12–15 feet, and bear in the last 1 foot several flower buds, 1 open flower at a time, and several old flowers. Flower buds are broader than long, pale yellow, tinged with red.

The large spreading flower is reddish, with mixtures of light yellow, white, lavender, and green. There is a conical or top-shaped yellow-green base (hypanthium) ⅜ inch long and broad, bearing 6 rounded reddish-tinged sepals 3/16 inch long. The petals are rounded, shiny, and about 2–2½ inches long, slightly unequal, concave but with edges slightly rolled under, pink red or orange red on upper surface and light yellow beneath. In the center is a disk 1¼–1½ inches in diameter with top curved over itself, bearing whitish stamens more than 1/16 inch high and bearing beneath the top and fringed around the edges many larger stamens 3/16–⅜ inch long, whitish and tinged with lavender and yellow at tip. Almost hidden underneath the disk is the pistil with its whitish partly inferor rounded 6-celled ovary ⅜ inch in diameter bearing a short stout style more than 1/16 inch high. The petals and stamens soon fall, leaving pistil and calyx, which generally are shed later also.

Usually a single cannonball develops on a branch, maturing in about 9 months or longer. The brown fruit (berry) is slightly scaly and bears in the upper part the 6 sepals now widely separated. It does not split open but falls to the ground and decays with strongly unpleasant odor opposite to that of the flowers. The yellow-green pulp turning purplish upon exposure contains many small brown seeds ⅜ inch long. Flowering almost continuously.

The light brown wood is soft, lightweight, and not durable. Elsewhere it is used for boxes, interiors, and construction.

It is reported that a depilatory is made from the fruit pulp.

A rare ornamental tree and botanical oddity in Puerto Rico, St. Thomas, and St. Croix, suitable for parks and gardens. Of rapid growth. Cultivated trees may be undesirable in shedding leaves more than once a year.

RANGE.—Native of northern South America from Guianas to Trinidad, Venezuela, and Colombia, and south to Peru and Brazil. Planted in tropical botanical gardens around the world. Rarely grown in Hawaii, southern Florida, and through the West Indies.

OTHER COMMON NAMES.—bala de cañón (Puerto Rico, Spanish); muco (Dominican Republic); maracao (Colombia); muco, coco de mono, mamey hediondo, tapara de chuco, tapara hediondo, taparón (Venezuela); cannonball-tree (English); moke, muco (Trinidad); boulet de canon, arbre à bombes, abricot de singe (French); calebasse colin (French Guiana); boskalebas, bosch kalebas, wilde abrikoos (Surinam); castanha de macaco, abricó de macaco, árvore de macaco, cuia de macaco, cuirana (Brazil).

BOTANICAL SYNONYMS.—*Couroupita surinamensis* Mart., *C. guianensis* var. *surinamensis* (Mart.) Eyma, *C. st.-croixiana* R. Knuth.

This family of tropical trees to which the brazilnut belongs has no native representatives in Puerto Rico.

547. **Bala de cañón, cannonball-tree** *Couroupita guianensis* Aubl.*

Flowers, leafy twig, and fruit, one-half natural size.

Small to large trees, commonly mangroves (*Rhizophora*) with prop roots, also shrubs, known by: (1) mangrove trees with prop roots in mangrove swamp forests on silt shores (*Cassipourea* in upland forests); (2) leaves opposite, usually entire, hairless, commonly leathery, with 1 or 2 stipules that form a ring at each node; (3) small lateral flowers solitary or in clusters (cymes), bisexual, regular, with persistent calyx of mostly 4–5 sepals commonly succulent, united at base, petals mostly 4–5 and often shorter, fringed and with narrow base, stamens mostly 8–16 inserted on disk, and pistil composed of 2–4-celled ovary inferior or partly so with 2 ovules in each cell, style, and 2–4-lobed stigma; and (4) indehiscent 1-seeded fruit that germinates in form of cigar before falling or berrylike and fleshy with 3–4 cells and seeds. Also vol. 1, p. 384.

Key to species

A. Leaves blunt-pointed, slightly leathery and fleshy; fruit dark brown, containing a germinating cigarlike seedling; tree with curved stilt roots, of muddy sea-shores—179. Mangle colorado, mangrove, *Rhizophora mangle* L.

AA. Leaves long-pointed, thin; fruit elliptic, greenish; tree without stilt rots, of uplands—548. *Cassipourea guianensis.*

548. Palo de gongolí, murta ***Cassipourea guianensis* Aubl.**

Small tree of moist forests, characterized by: (1) narrowly elliptic to ovate leaves 1½–4 inches long and ¾–1¾ inches wide, paired or opposite in 2 rows; (2) few small flowers at leaf bases, ⅜ inch long, with 4 narrowly stalked fringed hairy white petals; and (3) elliptic greenish fruit ⅜ inch long, slightly fleshy, with 1–4 seeds in a yellow covering.

An evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, sometimes larger, with horizontal branches. Bark dark gray, smooth to finely fissured. Inner bark light yellow, slightly bitter. Twigs slender, green with minute hairs when young, becoming gray or brown, with slightly enlarged ringed nodes. The bud is formed by a pair of very narrow green stipules less than 3/16 inch long, which leave a ring scar upon shedding early.

The paired hairless leaves spreading in 2 rows have slender leafstalks ⅛–¼ inch long. Blades are thin, long-pointed at apex, short-pointed at base, without teeth on edges, the upper surface shiny dark green with lateral veins few and inconspicuous, and the lower surface yellow green and slightly shiny.

The flowers are borne at leaf bases, few or sometimes only 1 on slender stalks ⅛–¼ inch long. The bell-shaped green calyx nearly ¼ inch long has 4 (sometimes 5) pointed lobes; the 4 (sometimes 5) petals ¼ inch long are distinctive in being narrowly stalked, fringed, and hairy, shedding early; about 10–16 short white stamens; and hairy whitish pistil with 3–4-celled superior ovary and 3–4 ovules, and slender style, and dotlike stigma. The berrylike fruit with style at apex contains 3–4 cells and seeds within a yellow covering (aril). Flowering irregularly through the year.

The sapwood is yellowish and thick, the heartwood pale brown. The wood is described as moderately hard, heavy, strong, splintery, and fine-textured. It finishes smoothly and is moderately durable. Elsewhere the wood has been used for poles, posts, railway crossties, house frames, and carpentry.

Uncommon but widespread in moist limestone, lower and upper Cordillera and Luquillo forests from sea level to 3,000 feet altitude in foothills and eastern and central mountains of Puerto Rico. Absent from adjacent islands.

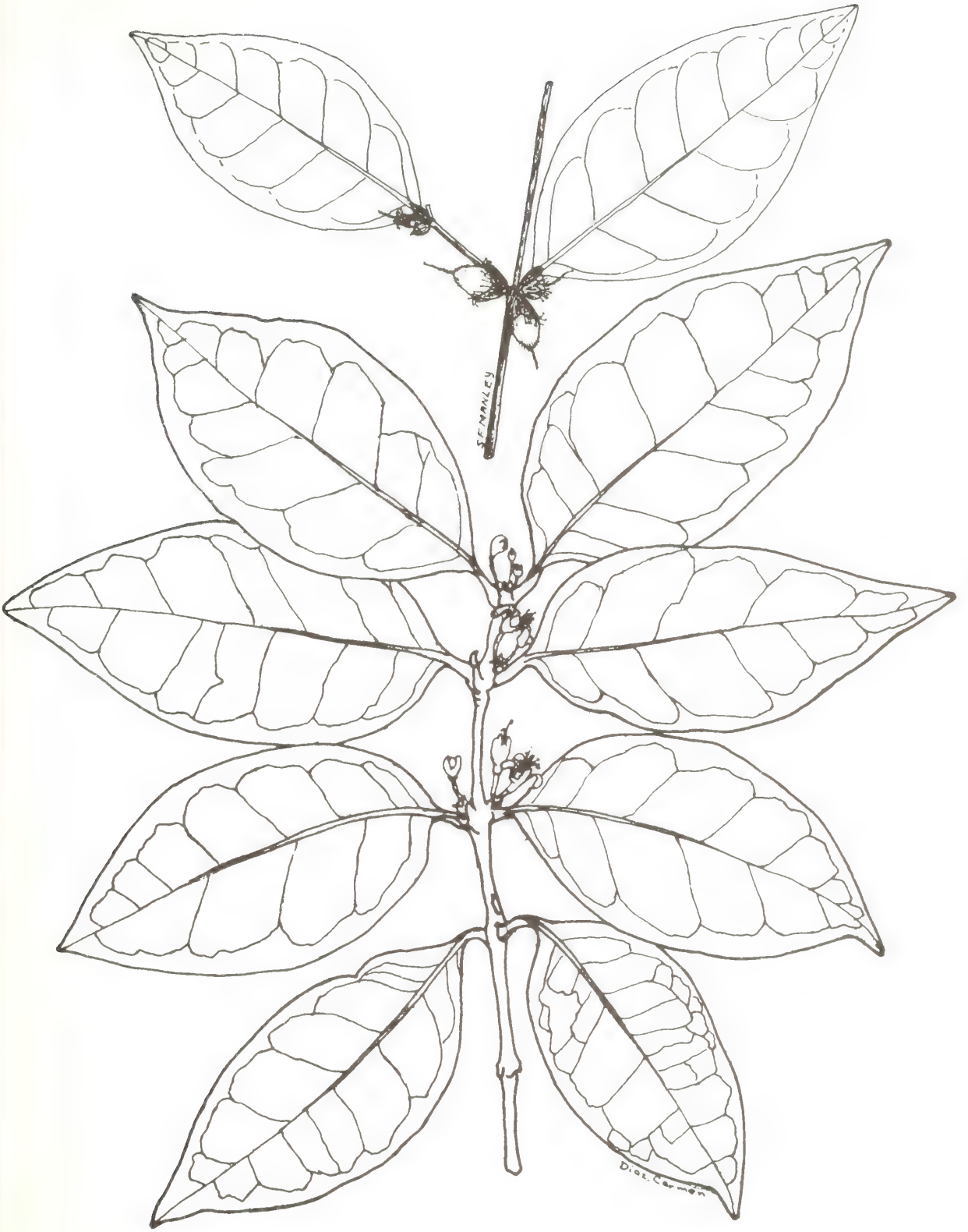
PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro, Vega.

RANGE.—Greater Antilles and Lesser Antilles from Montserrat and Guadeloupe to Grenada and Trinidad. Also from Mexico through Central America (except El Salvador) to Guianas, Brazil, Peru, and Ecuador.

OTHER COMMON NAMES.—palo de orejas, palo de gongolí, palo de toro (Puerto Rico); palo Robinson (Dominican Republic); cuco (Cuba); goatwood (Panama); mamoncillo, mamoncillo blanco (Venezuela); waterwood (British Honduras); goyavier, bois l'ill, bois die, bois agouti (Dominica); bois d'ail (Guadeloupe).

BOTANICAL SYNONYMS.—*Cassipourea alba* Griseb., *C. elliptica* (Sw.) Poir.

The West Indian species (*Cassipourea alba* Griseb.) has been united with the older widespread one of the continent. This tree is related botanically to No. 179, mangle or mangrove, *Rhizophora mangle* L., which forms swamp forests along silt seashores, spreading by stilt roots. The two are the only Puerto Rican representatives of their small family.



548. Palo de gongolí, murta *Cassipourea guianensis* Aubl.

Fruiting twig (above), flowering twig (below), natural size.

COMBRETUM FAMILY (COMBRETACEAE)

Trees, shrubs, and woody vines, known by: (1) leaves alternate or opposite, sometimes whorled, simple, entire, without stipules; (2) flowers generally small, in clusters (spikes, racemes, and panicles), mostly bisexual, regular, composed of cup-shaped base (hypanthium), persistent calyx of 4–5 (8) lobes, corolla of 4–5 small lobes or none, stamens 2–5 (10) around disk, and pistil with inferior 1-celled ovary with 2–6 ovules and slender style; and (3) fruit a drupe or winged (samara) with 2–5 wings and 1 seed. Vol. 1, p. 386.

Key to species (Nos. 180–184)

A. Leaves mostly clustered at ends of twigs; petiole without glands, blade broadest beyond middle; upland trees.
  B. Leaves less than 3 inches long, green or yellow green.
    C. Twigs spineless; fruit an elliptic pointed drupe about ⅛ inch long—180. Granadillo, *Buchenavia capitata* (Vahl) Eichl.
    CC. Twigs often with paired spines; fruits about ¼ inch long, with calyx at apex, some deformed as slender hornlike galls 2–3 inches long—181. Ucar, gregre, oxhorn bucida, *Bucida buceras* L.
  BB. Leaves 6–11 inches long, turning reddish before falling—184. Almendra, Indian-almond, *Terminalia catappa* L.*
AA. Leaves evenly spaced along twigs; petiole with 2 glands near the elliptic blade; trees of mangrove swamp forests.
  D. Leaves alternate, long-pointed at both ends—182. Mangle botón, button-mangrove, *Conocarpus erectus* L.
  DD. Leaves opposite, rounded at both ends—183. Mangle blanco, white-mangrove, *Laguncularia racemosa* (L.) Gaertn. f.

MYRTLE FAMILY (MYRTACEAE)

Trees, often large, and shrubs, known by: (1) leaves opposite (alternate in *Eucalyptus* and other Old World genera), simple, mostly small, entire, leathery, aromatic with gland dots, evergreen, without stipules; (2) generally many flowers in clusters (cymes, panicles, and racemes), large and showy, commonly white, bisexual, regular, the calyx generally of 4–5 sepals separate or united at base and commonly persistent at apex of fruit, generally 4–5 petals, very many long threadlike stamens, and pistil composed of inferior 1–5-celled ovary with 2 to many ovules in each cell, and long slender style; and (3) fruit a berry, often edible, or capsule with few to many seeds. Vol. 1, p. 396.

Key to species

A. Leaves alternate (often opposite on young plants); fruit a dry hard seed capsule; introduced species.
  B. Leaves narrow, short-stalked; flowers stalkless, crowded at ends and along twigs; sepals and petals present, the mass of stamens from many flowers resembling a bottle-brush.
    C. Leaves with 1 midvein; flowers red or pink—551. *Callistemon citrinus.**
    CC. Leaves with 5 (sometimes 7) main veins from base; flowers white; bark cream-colored, peeling in papery layers—583. *Melaleuca quinquenervia.**
  BB. Leaves broader, long-stalked, aromatic when crushed; flowers in stalked clusters (umbels), the calyx and corolla represented by a lid, the stamens spreading—*Eucalyptus.**
    D. Leaves with odor of lemon; flowers many in terminal clusters—559. *Eucalyptus citriodora.**
    DD. Leaves with resinous odor; flowers 10 or fewer in clusters at leaf bases.
      E. Leaves lance-shaped, less than 1¼ inches wide; seed capsules ⅜ inch long—560. *Eucalyptus resinifera.**
      EE. Leaves broadly lance-shaped, 1¼–2½ inches wide; seed capsules ½–⅝ inch long—186. Eucalipto, beakpod eucalyptus, *Eucalyptus robusta* J. E. Smith.*
AA. Leaves opposite; fruit a fleshy berry; native species (except Nos. 188, 189, 195, 580).
  F. Flower clusters (panicles) stalked, branched, usually many flowered; ovary with 2 cells, each with 1–2 ovules (6–7 in No. 194).
    G. Calyx forming cap in bud and splitting off evenly, leaving a short tube (hypanthium); petals none or minute; twigs often forking and zigzag in horizontal plane—*Calyptranthes.*
      H. Leaves less than 1 inch long, rounded or blunt at apex; flowers single and stalkless at leaf base (unknown in No. 552).
        I. Twigs densely rusty brown hairy—185. *Calyptranthes krugii.*
        II. Twigs hairless—552. *Calyptranthes kiaerskovii.*
      HH. Leaves more than 1¼ inches long; flowers in branched clusters.
        J. Leaves long-pointed at apex; twigs with pressed brown hairs when young.
          K. Fruits ½ inch in diameter—554. *Calyptranthes pallens.*
          KK. Fruits ¼–5/16 inch in diameter—556. *Calyptranthes sintenisii.*

JJ. Leaves short-pointed to round at apex.
L. Twigs hairy.
M. Twigs, young leaves, and branches of flower clusters with stiff hairs—557. *Calyptranthes thomasiana.*
MM. Twigs and branches of flower clusters densely brown hairy—555. *Calyptranthes portoricensis.*
LL. Twigs hairless.
N. Leaves short-pointed at both ends—558. *Calyptranthes zuzygium.*
NN. Leaves rounded at both ends—553. *Calyptranthes luquillensis.*
GG. Calyx with mostly 5 lobes or sepals persistent in fruit and mostly 5 petals.
O. Calyx lobes borne on a short tube or cup (hypanthium); ovary hairless or nearly so.
P. Leaves very aromatic, with odor of bay rum when crushed; cells of ovary each with 6–7 ovules—194. Malagueta, bay-rum-tree, *Pimenta racemosa* (Mill.) J. W. Moore.
PP. Leaves not or slightly aromatic.
Q. Leaves ovate to oblong, ¾–2¼ inches long, blunt or short-pointed at apex, turned under at edges—549. *Myrcia citrifolia.*
QQ. Leaves elliptic, 2–4 inches long, long-pointed at apex, not turned under at edges—550. *Myrcia leptoclada.*
OO. Calyx lobes without a tube or cup; ovary hairy.
R. Twigs, petioles, and branches of flower clusters densely brown hairy.
S. Leaves very convex; flowers ⅜ inch across; berries about ½ inch wide—582. *Gomidesia lindeniana.*
SS. Leaves flat; flowers ⅝ inch across; berries about ¼ inch wide—192. Cieneguillo, *Myrcia deflexa* (Poir.) DC.
RR. Twigs, petioles, and branches of flower clusters slightly gray hairy.
T. Leaves long- or short-pointed at apex.
U. Leaves with very long tapering point; berries elliptic or rounded, slightly longer than wide—193. Hoja menuda, *Myrcia splendens* (Sw.) DC.
UU. Leaves with shorter point; berries cylindric, twice as long as wide—585. *Myrcia fallax.*
TT. Leaves rounded or blunt at apex; fruits unknown—586. *Myrcia* (?) *paganii.*
FF. Flower clusters (usually racemes) usually not branched, sometimes short or only 1 flower; ovary with 2 or sometimes several cells, each with mostly more than 2 ovules.
V. Calyx closed in bud.
W. Calyx forming cap in bud and splitting off irregularly; flowers single on long stalk at leaf base—584. *Psidium sintenisii.*
WW. Calyx splitting open into 4–5 irregular lobes mostly persistent on fruit.
X. Flowers small, less than ¼ inch wide, stalkless or nearly so.
Y. Leaves elliptic, long-pointed at both ends, short-stalked; flower clusters almost stalkless—591. *Siphoneugena densiflora.*
YY. Leaves nearly round, notched at stalkless base; flowers clustered at end of stalk of 1 inch—589. *Marlierea sintenisii.*
XX. Flowers large, more than ½ inch wide, on stalks of more than ½ inch.
Z. Leaves oblong, short-pointed at base, slightly thickened, short-stalked—195. Guayaba, common guava, *Psidium guajava* L.*
ZZ. Leaves rounded, heart-shaped at base, thick, almost stalkless—590. *Psidium amplexicaule.*
VV. Calyx lobes 4, separate in bud.
a. Flowers mostly paired along an axis (raceme).
b. Tube (hypanthium) present on ovary, funnel-shaped, splitting off evenly at base—588. *Myrciaria floribunda.*
bb. Tube (hypanthium) mostly short, persistent with calyx lobes in fruit—*Eugenia* (key to species below).
aa. Flowers 1 or few at leaf base; tube very short, persistent with calyx lobes in fruit.
c. Flowers mostly 3 or 7, the stalkless end flower developing first (cyme)—587. *Myrcianthes fragrans.*
cc. Flowers mostly 1, sometimes 3—*Eugenia* (key to species below).

Key to tree species of *Eugenia*

A. Flower clusters terminal or back of leaves; flowers large, more than 2½ inches across stamens; tube (hypanthium) funnel-shaped or cup-shaped, also forming false stalk at base of ovary; introduced species (*Syzygium*).
B. Flowers purplish red; fruits pear-shaped (Malay-apple)—189. Manzana malaya, Malay-apple, *Eugenia malaccensis* L.*
BB. Flowers white; fruits rounded (rose-apple)—188. Pomarrosa, rose-apple, *Eugenia jambos* L.*
AA. Flower clusters lateral, mostly at leaf bases; flowers less than 2 inches across stamens, white; tube (hypanthium) short, not forming false stalk; native species (except No. 580).
C. Leaves large, oblong to elliptic, 4–7 inches long; flowers borne on trunk—570. *Eugenia haematocarpa.*
CC. Leaves smaller; flowers on twigs.
D. Flowers single on long stalks at base of narrow scales back of leaves; berry red, edible.
E. Leaves ovate, rounded or slightly notched at base; fruit grooved—580. *Eugenia uniflora.**
EE. Leaves narrowly elliptic, short-pointed at base; fruit not grooved—571. *Eugenia ligustrina.*
DD. Flowers mostly clustered.
F. Flowers stalked.

G. Flowers large, more than 1½ inches across stamens.
H. Leaves elliptic, short-pointed at base, short-stalked—191. Guayabota, *Eugenia stahlii* (Kiaersk.) Krug & Urban.
HH. Leaves rounded, slightly notched at base, stalkless—564. *Eugenia borinquensis.*
GG. Flowers small, less than ½ inch across stamens.
I. Flowers several borne along an axis (raceme).
J. Leaves 2–4½ inches or more in length; fruits ⅜–⅝ inch in diameter.
K. Fruits smooth, blackish purple—187. Guasábara, *Eugenia domingensis* Berg (*E. aeruginea*).
KK. Fruits warty—568. *Eugenia eggersii.*
JJ. Leaves ¾–2½ inches long; fruits 5/16 inch in diameter, reddish—562. *Eugenia biflora.*
II. Flowers few or sometimes single.
L. Leaves nearly round, ⅝–2 inches long and broad, slightly thick and leathery—581. *Eugenia xerophytica.*
LL. Leaves longer than broad, mostly thin.
M. Leaves small, less than 1½ inches long, and narrow, less than ½ inch wide, with petioles less than ⅛ inch long; twigs finely hairy when young.
N. Leaves dull on upper surface.
O. Leaves oblanceolate, rounded at apex and broadest beyond middle, with skunklike odor when crushed—572. *Eugenia foetida.*
OO. Leaves lance-shaped to narrowly ovate—573. *Eugenia monticola.*
NN. Leaves shiny on upper surface, ovate—563. *Eugenia boqueronensis.*
MM. Leaves mostly more than 1½ inches long and ½ inch wide, short-stalked.
P. Twigs finely hairy.
Q. Fruits oblong, ⅜–½ inch long, black—569. *Eugenia glabrata.*
QQ. Fruits round.
R. Fruits ⅜–⅝ inch in diameter, red or yellow—575. *Eugenia pseudopsidium.*
RR. Fruits ⅜ inch in diameter, black—574. *Eugenia procera.*
PP. Twigs hairless.
S. Flowers few on short stalks less than ¼ inch long—561. *Eugenia axillaris.*
SS. Flowers several on slender stalks of equal length, mostly more than ½ inch long.
T. Leaves dull green on upper surface; fruits red to black at maturity—190. Hoja menuda, spiceberry eugenia, *Eugenia rhombea* (Berg) Krug & Urban.
TT. Leaves shiny on upper surface; fruits orange to scarlet at maturity—565. *Eugenia confusa.*
FF. Flowers stalkless or almost so.
U. Leaves elliptic or nearly round, thick and leathery, with edges much rolled under; flowers about ½ inch across; berries about ¾ inch in diameter, rose-colored—577. *Eugenia sessiliflora.*
UU. Leaves elliptic to ovate, only slightly thickened, not turned under at edges; flowers less than ¼ inch across; berries about ¼ inch in diameter.
V. Leaves short-pointed at base, short-stalked—578. *Eugenia sintenisii.*
VV. Leaves rounded or notched at base, stalkless or nearly so.
W. Leaves ovate, blunt or rounded at apex, mostly rounded at base; twigs hairless—579. *Eugenia stewardsonii.*
WW. Leaves elliptic, rounded at apex, notched and slightly clasping at base; twigs finely hairy when young—566. *Eugenia cordata.*

Incompletely known species omitted from key: 567. *Eugenia* (?) *corozalensis;* 576. *Eugenia serrasuela.*
Species omitted as shrubs not known to reach tree size: *Eugenia* (?) *bellonis* Krug & Urban, *Eugenia margarettae* Alain, *Eugenia underwoodii* Britton.

549. Limoncillo del monte — *Myrcia citrifolia* (Aubl.) Urban

Limoncillo del monte, also one of the species called hoja menuda, is distinguished by: (1) small shiny elliptic to oblong opposite leaves, thick and stiff, turned under at edges, with gland dots; (2) white flowers ¼ inch across the 5 petals and many spreading stamens, few on slender stalks at end of twig; and (3) rounded red to black berries ¼–⅜ inch in diameter, with cup and 5-lobed calyx at apex.

An evergreen shrub or small tree to 20 feet high and 3 inches in trunk diameter, reported to reach 50 feet. The bark is gray, smoothish, with thin fissures, peeling off in thin flakes and exposing reddish brown inner layer. The inner bark is greenish and slightly bitter. Twigs are very slender, brown with minute hairs.

The opposite leaves have short finely hairy petioles 1/16–⅛ inch long. Blades are ¾–1¾ inches long and ⅜–¾ inch wide, hairless, blunt or short-pointed at apex, short-pointed at base, with side veins inconspicuous, the upper surface yellow green to dark green and shiny, and the lower surface dull light green.

Flower clusters (panicles) terminal, 1–1½ inches long including slender stalk and branches. The flower on a slender stalk ¼–⅝

549. Limoncillo del monte *Myrcia citrifolia* (Aubl.) Urban

Fruiting twig (above), flowering twig (below), natural size.

inch long is composed of hairless gland-dotted base (hypanthium) with short tube or cup beyond ovary and 5 short calyx lobes; 5 dotted white petals nearly 1/8 inch long, many spreading stamens, and pistil with inferior ovary and slender style. The fruits have dark purple flesh, almost tasteless, and 1–3 brown seeds nearly 1/4 inch long. With flowers from spring to fall and with fruits from summer to winter.

The wood is light brown and hard.

Elsewhere the flowers and leaves have served in home remedies.

Locally common in lower Cordillera, moist limestone, and moist coastal forests from sea level to 2,200 feet altitude. Southwestern slopes of central mountains, northwestern limestone ridges, and near Tortuguero Lagoon. Also through the Virign Islands, including St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Guajataca, Maricao, Río Abajo, Susúa; Virgin Islands, Gorda Peak.

RANGE.—Cuba, Hispaniola, Puerto Rico and Virgin Islands, and Lesser Antilles from St. Martin and Saba to Grenada and Barbados. Also Venezuela, Guyana, and Surinam.

OTHER COMMON NAMES.—hoja menuda (Puerto Rico); hoja menuda, pimienta cimarrona (Cuba); red rodwood (Barbados); bois de fer (St. Lucia); malagueta (Dominican Republic); poivrier Jamaïque (Haiti); bois ti feuilles (Guadeloupe); ti feuilles, merisier (Martinique); kurupum (Dominica).

BOTANICAL SYNONYMS.—*Aulo myrcia citrifolia* (Aubl.) Amah., *Eugenia saviaefolia* Alain.

This species and the next have been placed also in the segregate genus *Aulomyrcia* and are out of alphabetical order here following a preliminary listing.

550. Guayabacón ***Myrcia leptoclada* DC.**

This species of guayabacón is characterized by: (1) red-brown smoothish bark, papery and peeling off, exposing green beneath; (2) shiny ovate to elliptic opposite leaves 1 3/4–4 1/2 inches long and 5/8–2 inches wide, long-pointed and slightly thickened and leathery, dark red when young; (3) small white flowers 3/16 inch across the 5 petals and many spreading stamens, several to many at ends and sides of twigs; (4) rounded to slightly flattened or 4-lobed black berries nearly 3/8 inch in diameter, with cup and 5-lobed calyx at apex.

An evergreen small tree to 35 feet high and 8 inches in trunk diameter. The red-brown smoothish bark resembles that of No. 105, almácigo, turpentine-tree, or gumbo-limbo (*Bursera simarouba* L.), peeling off in papery flakes. The inner bark is whitish beneath the outer green layer and astringent. The slender brownish twigs have flat brownish hairs when young.

Leaves opposite, hairless, with short petioles 1/8–1/4 inch long. Blades are long-pointed at apex, short-pointed or rounded at base, not turned under at edges, with gland dots, the upper surface shiny with midvein sunken and many fine inconspicuous straight side veins. The foliage turns black in drying.

Flower clusters (panicles) 2–3 1/2 inches long, mostly lateral, and irregularly branched. Flowers many, stalkless or very short-stalked, from top-shaped buds less than 1/8 inch long. The hairless base (hypanthium) with short tube or cup beyond ovary and 5 unequal rounded hairy lobes about 1/16 inch long; 5 white petals 1/16 inch long; many spreading stamens; and pistil with inferior ovary and long slender style. The fruits are hairless, slightly flattened, and contain 1–2 seeds (rarely 3–4), rounded and brownish, 3/16–1/4 inch long. Flowering in spring and maturing fruits in summer and autumn.

The light brown wood is very hard, very heavy, fine-textured, and reported to be durable. It is used for fence posts.

Uncommon in lower Luquillo and moist limestone forests from sea level to 1,500 feet altitude. Eastern mountains and northwestern limestone hills of Puerto Rico. Not in Virgin Islands.

PUBLIC FORESTS.—Carite, Guajataca, Luquillo, Río Abajo.

RANGE.—Hispaniola, Puerto Rico, Guadeloupe, Dominica, Martinique, St. Vincent, and Trinidad. Also Surinam and recorded doubtfully from Jamaica. Also Guatemala, British Honduras, and Honduras in Central America.

OTHER COMMON NAMES.—hoja menuda roja (Puerto Rico); guayabón, huesito (Dominican Republic); wild guava (Trinidad); parrot-plum (British Honduras); guépois, bois guépois (Guadeloupe, Martinique); dji-pois (Dominica).

BOTANICAL SYNONYM.—*Aulomyrcia leptoclada* (DC.) Berg.

550. Guayabacón *Myrcia leptoclada* DC.

Fruiting twig (above), flowering twig (below), natural size.

551. Bottlebrush ***Callistemon citrinus* (Curtis) Skeels***

Bottlebrush, an ornamental shrub or small tree, is recognized by: (1) the crowded stalkless brilliant red flowers in a mass extending 2–4 inches long and 1½ inches wide at or near the end of a slender drooping twig, the spreading dark red stamens suggesting a bottlebrush; (2) the very narrow dull green stiff leaves 1¼–2½ inches long and about ¼ inch wide, resinous or aromatic when crushed; and (3) the stalkless rounded brownish seed capsules about 3/16 inch long, opening by 3 teeth at apex.

An evergreen planted shrub or small tree becoming 20 feet high and 6 inches in trunk diameter, with long slender drooping or "weeping" twigs. The bark is brownish gray and furrowed or shreddy. The twigs are light gray, finely hairy when young.

The many alternate leaves spread in all directions on short hairy petioles less than ⅛ inch long. Blades are narrowly lanceolate or linear, slightly thickened and stiff, long-pointed at both ends and not toothed on edges, dull green and without visible side veins, hairy when young but becoming nearly hairless, with numerous gland dots visible with a lens.

Many stalkless flowers about ⅞ inch long in a cluster (spike) at or near the end of a twig are composed of bell-shaped greenish hairy base (hypanthium), which bears the other parts including 5 blunt greenish calyx lobes; 5 rounded concave light green petals ⅛ inch long; many dark red stamens ⅝–¾ inch long in a spreading brushlike mass; and pistil with inferior 3-celled ovary containing many ovules, threadlike red style slightly longer than stamens, and dotlike stigma. The hard woody seed capsules contain many minute brown seeds about 1/16 inch long and persist as the twig elongates and produces additional zones of leaves and flowers. Flowering irregularly during the year, collected with flowers and old fruits in March.

The light brown wood is hard and heavy. In the native home it has been used for tool handles.

Uncommon as an ornamental around houses. Not mentioned by Britton and Wilson (*10*). Grown also in Florida, Arizona, and California and in greenhouses northward. Bottlebrushes of this and related species are planted in Florida to brighten small areas as well as the landscape. Average in growth rate and tolerant of poor soil, salt, and drought.

RANGE.—Native of Australia but widely planted in tropical and subtropical regions.

OTHER COMMON NAMES.—lemon bottlebrush, citrus-leaf bottlebrush (United States); limpia botella (Dominican Republic); bottlebrush, red bottlebrush (English).

BOTANICAL SYNONYM.—*Callistemon lanceolatus* (Smith) DC.

The generic name means beauty and stamen or thread, describing the stamens, while the specific name from citrus refers to the lemon-like odor of the crushed leaves.

551. Bottlebrush *Callistemon citrinus* (Curtis) Skeels*

Natural size.

552. ***Calyptranthes kiaerskovii* Krug & Urban**

Twigs forking in 2's, hairless. Leaves opposite with petioles less than 1/8 inch long, obovate, 1 inch or less in length and 3/8–3/4 inch wide, blunt or rounded at apex, short-pointed at base, not toothed on edges, slightly thickened, with minute gland dots, hairless, the upper surface shiny with prominent network of veins, and lower surface paler. Known only from a specimen of foliage without flowers or fruits collected at Tortola nearly a century ago and not found afterwards. The only flowering plant species restricted, or endemic, to Tortola. An uncertain and incompletely known species.

553. ***Calyptranthes luquillensis* Alain**

The scientific name and the English name lidflower describe this genus, which has the calyx closed and cuplike, not divided into lobes but falling away like a cap or lid. Also, petals are lacking or minute. This distinctive small tree rare in Luquillo Mountains was named in 1963. It is characterized by: (1) opposite oblong to elliptic thick and leathery dark green leaves 2–4 1/4 inches long and 1 1/8–2 inches wide, rounded at both ends; and (2) whitish flowers in ball-like heads 3/4–1 inch in diameter with many stamens, 1 or 2 heads on long stout stalks 1/2–3 3/4 inches long at ends or sides of twigs.

An evegreen shrub or small tree to 15 feet high and almost 3 inches in trunk diameter, with narrow compact crown. Bark smooth, gray, the inner bark light brown. Twigs brown, hairless.

Leaves opposite, hairless, with short stout petioles 1/8–1/4 inch long. Blades are slightly turned under at edges, the upper surface very dark green and shiny, with many fine inconspicuous side veins, and the lower surface dull yellow green. Older leaves and twigs sometimes are partly covered by a blackish sooty mold.

The flower cluster is a mass of many whitish spreading threadlike stamens, from many crowded stalkless flowers without corolla. Each flower is composed of cup-shaped base (hypanthium) 1/8 inch long and finely hairy, bearing the calyx, which covers bud and splits open as a rounded convex lid on 1 side; many threadlike stamens 1/4 inch long; and pistil with inferior ovary and long slender style 5/16 inch long. Fruit not described. Collected with flowers in June and July.

Wood whitish, hard.

Rare in upper Luquillo forest at 2,000 feet altitude.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquillo Mountains of eastern Puerto Rico.

This rare species was first collected by Leslie R. Holdridge, of the U. S. Forest Service, in 1939 and was named in 1963. It is distinguished from other species of the Caribbean area by its large shiny leaves and long stout stalks bearing large ball-like heads of flowers.

553. *Calyptranthes luquillensis* Alain

Flowering twig, natural size.

554. Tapón blanco, pale lidflower ***Calyptranthes pallens* Griseb.**

This small tree is characterized by: (1) young twigs slightly flattened and 2-angled and with rusty-brown pressed hairs; (2) paired elliptic leaves 1¼–3 inches long and ⅝–1½ inches wide, long-pointed at both apex and base; (3) many small white flowers about ⅛ inch wide in branched clusters at ends and sides of twigs, the calyx covering bud and falling off like a lid or cap and the petals absent; and (4) fruit a rounded dark purple berry ½ inch in diameter, juicy and edible, with small cup at apex.

A small evergreen tree to 20 feet high and 6 inches in trunk diameter or a shrub. Bark gray, smooth or becoming scaly, the inner bark brown and almost tasteless. Twigs slender, spreading fanlike, when young slightly flattened and 2-angled and with pressed rusty-brown hairs, becoming gray. Buds composed of pair of minute hairy leaves.

The opposite leaves have petioles ¼–½ inch long. Blades are slightly thickened and turned under at edges, the upper surface shiny green to dark green and almost hairless, and the lower surface dull light green, with minute pressed hairs and gland dots.

Flower clusters (panicles) 2–3 inches long, the slender slightly flattened branches with pressed reddish-brown hairs and ending in 3 stalkless flowers. The flowers covered in finely hairy bud by rounded calyx which falls off like a lid or cap; petals none; stamens many; and pistil with inferior ovary and cuplike tube (hypanthium) above. Immature fruits brown, dry. Berries finely hairy, containing 2–4 seeds. With flowers in spring and summer and fruits in summer.

Heartwood brown tinged with red, the sapwood light brown. Wood heavy, hard, fine-grained.

The aromatic leaves are used for tea in folk medicine elsewhere.

Local mainly in moist coastal forest of Puerto Rico but from sea level to 2,500 feet altitude in mountains. Also Mona, St. Croix, and St. Thomas. Though known from the other islands, this species apparently was not found in Puerto Rico until 1950.

PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Guánica, Maricao, Río Abajo, Vega.

RANGE.—Southern Florida including Florida Keys, Bahamas, Greater Antilles, Virgin Islands, Cayman Islands, and Guadeloupe. Also Mexico and Guatemala.

OTHER COMMON NAMES.—arrayán, limoncillo (Dominican Republic); guayabillo (Guatemala); stopper-wood, spice-wood, white stopper (Bahamas); pale lidflower, spicewood, white spicewood (United States).

554. Tapón blanco, pale lidflower *Calyptranthes pallens* Griseb.

Fruiting twig (above), old flowers (lower left), natural size.

555. ***Calyptranthes portoricensis*** **Britton**

This rare species of Puerto Rican mountains is identified by: (1) twigs and branches of flower clusters densely brown hairy; (2) paired elliptic or ovate thick and leathery leaves 1¼–2¾ inches long, and ⅞–1¾ inches wide, hairy below when young; and (3) round finely hairy fruits 3/16 inch in diameter, with raised ring at apex.

An evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter. Leaves opposite, blunt or short-pointed at apex and blunt or rounded at base, the edges straight or slightly turned under, with faint gland dots, the upper surface hairless, the lower surface hairy when young with raised midvein and with side veins obscure.

Flower clusters (panicles) composed of long stalk to 2¾ inches and several nearly stalkless flowers. The pear-shaped calyx is less than ⅛ inch long, densely brown hairy, caplike, and splits off. Flowering in spring, the flowers not yet described.

Rare in upper Luquillo and Cordillera forests at 2,500–3,500 feet altitude.

PUBLIC FORESTS.—Luquillo, Maricao.

RANGE.—Known only from high mountains of Puerto Rico. Named in 1924 from a specimen collected by Frank Lincoln Stevens (1871–1934), botanist of the United States, in 1913 while directing the College of Agriculture at Mayaguez.

555. *Calyptranthes portoricensis* Britton

Fruiting twig, natural size.

556. Limoncillo del monte ***Calyptranthes sintenisii* Kiaersk.**

Distinguishing characters of this rare small tree are: (1) crushed foliage with strong odor and taste of lemon; (2) paired elliptic leaves 2–3½ inches long and 1–1½ inches wide, ending in abrupt long point, the upper surface dark green and slightly shiny or dull with edges slightly rolled under, the lower surface dull yellow green; (3) many small whitish flowers about ¼ inch long and broad across the many stamens, with calyx covering bud and falling off like a lid, in branched clusters at leaf bases; and (4) fruit a rounded berry ¼–5/16 inch in diameter, purplish black, with ring scar of calyx at apex.

An evergreen small tree to about 33 feet high and 4 inches in trunk diameter, or sometimes shrubby. The bark is gray brown and smooth, with many raised dots (lenticels), becoming slightly fissured. The inner bark is reddish and slightly astringent. The twigs are slender and light brown, when young yellow green with minute brown pressed hairs, becoming slightly fissured, and ending in a minute hairy bud at base of last pair of leaves.

The opposite leaves have slender light green petioles ⅛–¼ inch long, with brown hairs when young. The blades are short-pointed at base, thin or slightly thickened, have minute gland dots visible with a lens, are hairless above, but have minute brown hairs along midrib beneath, the many lateral veins inconspicuous.

The branched flower clusters (panicles) at leaf bases are 1–2½ inches long. Flower buds are less than ⅛ inch long, elliptic, greenish white or also pinkish tinged, with gland dots and slightly hairy. The flower is composed of basal tube (hypanthium) 1/16 inch long, which extends cuplike beyond inferior ovary; rounded calyx like lid or cap which splits off and remains attached like 1 round sepal 1/16 inch long; many spreading threadlike stamens about 3/16 inch long; and pistil with minute inferior light green ovary, 2-celled with 2 ovules in each cell, and slender white style. Flowering and fruiting in spring.

The few berries are yellow green when immature, turning to purplish black, slightly shiny, the apex with ring scar of calyx 1/16 inch in diameter. The pulp is thin, purple, aromatic, with spicy taste of lemon. There is 1 shiny light brown, rounded seed less than 3/16 inch in diameter. Collected in flower in April and in fruit in June and July.

The wood has light brown sapwood and brown heartwood and is hard and heavy.

Rare in upper Luquillo and moist coastal forests from sea level to 3,000 feet altitude in Luquillo Mountains and Bayamón and Dorado areas of Puerto Rico.

PUBLIC FOREST.—Luquillo.

RANGE.—Puerto Rico and Hispaniola.

OTHER COMMON NAMES.—limoncillo, hoja menuda (Puerto Rico), limoncillo cimarrón, malagueta (Dominican Republic).

The specific name honors the discoverer, Paul Ernst Emil Sintenis (1847–1907) of Germany, who collected many plant specimens in Puerto Rico in the years 1884–87.

556. Limoncillo del monte *Calyptranthes sintenisii* Kiaersk.

Fruiting twig (above), flowering twig (below), natural size.

557. ***Calyptranthes thomasiana* Berg.**

This evergreen shrub or small tree to 30 feet high and 5 inches in trunk diameter is distinguished by: (1) stiff hairs on twigs, young leaves, and branches of flower clusters; (2) opposite leaves, with petioles 1/8 inch long, obovate to oblong, 3/4–1 3/4 inches long, blunt at apex, short-pointed at base, stiff and leathery, with gland dots, the upper surface shiny and lacking side veins, and the lower surface dull with faint veins; and (3) few flowers at leaf bases, the buds 1/8 inch long and pointed, with 4 small petals. Flowers and fruits have not been described. Locally common on mountains at 300–800 feet altitude in St. Thomas and Vieques. Named from St. Thomas in 1855, and found on Vieques by one of the authors. Known only from these two islands.

558. Myrtle-of-the-river ***Calyptranthes zuzygium* (L.) Sw.**

This rare tree first collected in Puerto Rico in 1950 is distinguished by: (1) paired elliptic leaves 1 1/2–2 3/4 inches long and 3/4–1 1/2 inches wide, with raised midvein, hairless, with short petioles 1/8–3/16 inch long; (2) few small whitish flowers 1/8–3/16 inch across the many thread-like stamens, at ends of very slender hairless branches at leaf bases, the calyx covering bud and falling off like a lid or cap and the petals absent; and (3) fruit a rounded reddish berry 1/4–5/16 inch in diameter, with small cup at apex.

A small evergreen tree to 25 feet high and 5 inches in trunk diameter, hairless throughout. Bark gray, smooth, the inner bark light brown and slightly bitter. Twigs very slender, branching in horizontal plane, when young slightly flattened and 2-angled and light green but becoming light gray, hairless, often forking widely. Buds minute, of paired young leaves.

Leaves opposite, short-pointed at both ends, turned under at edges, slightly thickened, the upper surface shiny green to dark green with raised midvein and faint side veins, and the lower surface dull yellow green with gland dots. New leaves are reddish.

Flower clusters (cymes) 2–3 inches long, the slender hairless branches ending in 1–3 flowers on short stalks of about 3/16 inch. Flowers are covered in bud by the rounded greenish calyx which falls off like a lid or cap; petals none; stamens many; and pistil with inferior ovary, cuplike tube above, and slender style nearly 1/4 inch long. Berries contain 1–4 shiny brown elliptic seeds 3/16 inch long. Flowering in spring, with fruits in summer.

Wood light brown, hard.

Rare in moist limestone forest to 300 feet altitude on north coast of Puerto Rico.

PUBLIC FOREST.—Cambalache.

RANGE.—Southern Florida including Florida Keys, Bahamas, and Greater Antilles.

OTHER COMMON NAMES.—palo de puerco, escobón (Dominican Republic); mondacapullo, arraiján blanco (Cuba); myrtle-of-the-river (United States, Bahamas).

This species ranges from Florida and Bahamas to Cuba, Jamaica, and Hispaniola, and has been found in Puerto Rico at its eastern limit. The scientific name has been spelled also *Calyptranthes syzygium*.

558. Myrtle-of-the-river *Calyptranthes zuzygium* (L.) Sw.

Fruiting twig (above), flowering twig (below), natural size.

559. Eucalipto, lemon eucalyptus — *Eucalyptus citriodora* Hook.*

A large evergreen tree with straight trunk and narrow crown rare in experimental forest plantations, identified by: (1) smooth whitish bark, peeling in small patches, and becoming mottled; (2) alternate lance-shaped, slightly curved long-pointed leaves 4–8 inches long and ⅜–1 inch wide, dull green, with strong lemon odor, those of young plants opposite, broader, and hairy; (3) many flowers about ½ inch long and broad, 3–5 together on short stalks in large terminal or lateral clusters; and (4) urn-shaped or cylindric seed capsules ⅜ inch long and broad. The wood is described as light gray or brown, very hard, heavy, very durable, and suitable for general use and poles. The leaves yield citronella oil and a perfume for soap. Rare in forest plantations in Puerto Rico. PUBLIC FOREST—Cambalache. RANGE.—Native of Australia (Queensland) but introduced mainly as an ornamental into other tropical regions including California and Hawaii. OTHER COMMON NAMES.—lemon-scented gum, lemon-scented spotted gum (English); eucalipto (Spanish).

560. Eucalipto, kino eucalyptus — *Eucalyptus resinifera* J. E. Smith*

This species of eucalyptus tested in forest plantations is characterized by: (1) reddish brown bark, rough, furrowed, thick, and very fibrous; (2) the slender twigs, petioles, and old leaves pinkish tinged; (3) lance-shaped dark green leaves 3½–6 inches long and ¾–1¼ inches wide, slightly curved and unequal-sided from the short-pointed base, with long tapering point, stiff and leathery, with spicy resinous odor (when crushed) and taste; (4) cream-colored flowers with very many stamens in spreading mass nearly 1 inch across, several lateral at end of flattened stalk; and (5) cup-like green seed capsules ⅜ inch long and 5/16 inch broad.

A large evergreen tree becoming more than 50 feet tall and 1 foot in trunk diameter with straight axis and narrow to spreading dense crown of dark green foliage, hairless throughout. Bark on branches is light gray and smoothish. Inner bark is reddish brown, fibrous, and tasteless. The long slender twigs have brown dots (lenticels).

The alternate leaves droop from slender petioles ¾–1 inch long. Blades have light yellow midrib and many faint side veins, are not toothed on edges, are dull dark green above and slightly paler beneath, with many gland dots visible with lens against the light. The first few leaves of young plants are opposite and much smaller.

The clusters (umbels) of 6–10 short-stalked flowers are borne at the end of a slightly flattened stalk ½–¾ inch long at leaf bases. Flower buds are about ⅝ inch long and ¼ inch wide, long-pointed at both ends, yellowish green, the upper half a long-pointed cap formed from calyx and corolla and splitting off. The cuplike base (hypanthium) bears on its rim many threadlike stamens more than ⅜ inch long, which shed early. The pistil has an inferior 3–4-celled ovary with many ovules and greenish style. The persistent seed capsules contain many minute seeds that sift out through 3–4 pores below the rim. Flowering and fruiting in spring.

The dark red wood is hard, heavy, and fine-textured and has many uses.

One of the most promising of more than 30 species of *Eucalyptus* that have been tested experimentally in forest plantations in Puerto Rico. Apparently some trees are hybrids of this and other species. Elsewhere the wood of these fast-growing trees is used for paper pulp.

PUBLIC FOREST.—Toro Negro.

RANGE.—Native of Australia but widely grown in forest plantations in tropical and subtropical countries.

OTHER COMMON NAMES.—eucalipto medicinal (Puerto Rico); eucalipto (Spanish); kino-gum eucalyptus, red-mahogany eucalyptus, eucalyptus, eucalypt, red-mahogany (English).

560. Eucalipto, kino eucalyptus *Eucalyptus resinifera* J. E. Smith*

Leafy twig (above), fruits and flowers (below), natural size.

561. Grajo, white-stopper eugenia ***Eugenia axillaris*** **(Sw.) Willd.**

Grajo, a small tree of dry forests, is characterized by: (1) opposite elliptic to ovate leaves 1½–3 inches long and ¾–2¾ inches wide, long-pointed at apex, the upper surface green to dark green and slightly shiny, with few inconspicuous veins, the petioles often purplish, and the foliage with slightly unpleasant odor; (2) small white 4-parted flowers 3/16 inch across, few at leaf bases; and (3) round black fruits ⅜ inch in diameter or often deformed and swollen to ½ inch or more in diameter and yellowish.

Evergreen shrub or small tree 20 feet high and 5 inches in trunk diameter, reported to reach 40 feet in height and 1 foot in diameter, hairless. The bark is gray, becoming rough and slightly fissured or furrowed, the inner bark pink brown, hard, and bitter. Twigs are slender and light gray.

The opposite leaves have slender purplish or light green curved petioles ⅛–¼ inch long, without stipules. Blades are short-pointed at base, slightly thickened, slightly turned up at midvein and under at edges, with few inconspicuous side veins, with minute blackish gland dots visible with a lens on lower surface and against the light, the lower surface dull light green.

Flowers few or 1 at leaf base, on short stalks less than ¼ inch long or almost stalkless. The flower consists of a greenish cuplike base (hypanthium) less than 1/16 inch long, which encloses the inferior ovary and bears 4 round light green, gland-dotted sepals 1/32 inch long, 4 round white gland-dotted petals 1/16 inch long, many spreading stamens, and style ⅛ inch long. The berry retains the 4 sepals at apex, changes color from green to red to black. It is edible, juicy and sweet but is often deformed by insect larvae within. There is 1 brown rounded seed ¼ inch in diameter. Flowering and fruiting in spring and summer, the fruits persisting.

The sapwood is light brown and the heartwood brown, often tinged with red. The wood is described as heavy, hard, very fine-textured, and strong.

Uncommon in moist limestone and coastal forests from sea level to 2,500 feet altitude in western coast and mountains of Puerto Rico, also northeastern end. Also Mona, Desecheo, Muertos, and through islands eastward including Icacos, Vieques, St. Croix, St. Thomas, Tortola, and Anegada.

PUBLIC FORESTS AND PARK.—Cambalache, Guánica, Guajataca, Maricao, Estate Thomas; Buck Island Reef.

RANGE.—Florida including Florida Keys, Bermuda, Bahamas, Cayman Islands, Greater Antilles, Virgin Islands, and from St. Martin and St. Barts to Guadeloupe, Dominica, St. Lucia, and St. Vincent. Also from southern Mexico and British Honduras to Nicaragua.

OTHER COMMON NAMES.—murta (Puerto Rico); escobón colorado, escobón de vara, palo de hueso (Dominican Republic); guairaje, guairaje colorado, grajo (Cuba); guayabillo (Mexico, Guatemala); guayacán negro, escobo, chamiso (El Salvador); white-stopper eugenia, stopper, white-stopper (United States); white-stopper, wattle (Bahamas); mérisier (St. Barts); mérisier, mérisier pays, mérisier petites feuilles (Martinique); choakyberry, pigeonberry (Dutch Antilles); black-cherry, rodwood, brown-leaf rodwoood (Jamaica).

In number of native tree species, 26, *Eugenia* is the largest genus in Puerto Rico and the Virgin Islands, as noted in the Statistical Summary. Three additional introduced species are included in this reference, and 2 others are shrubs. The generic name commemorates Prince Eugene of Savoy (1663–1736), a patron of botany and horticulture who made a collection of rare plants in the gardens of Belvidere Palace near Vienna.

561. Grajo, white-stopper eugenia *Eugenia axillaris* (Sw.) Willd.

Flowering twig (above), fruiting twig (below), natural size.

562. Pitangueira ***Eugenia biflora* (L.) DC.**

Various species of small trees belonging to this and a related genus (*Myrcia*) are known as hoja menuda. They have the following characteristics in common: (1) opposite short-stalked small leaves usually hanging vertically, lance-shaped to elliptic, long or short-pointed at apex, with numerous minute gland dots; (2) small white flowers usually in short lateral clusters, with 4 or 5 calyx lobes, 4 or 5 white petals, numerous spreading white stamens, and inferior ovary; and (3) fruit a rounded or elliptic berry, usually blackish or sometimes reddish, with sepals (ring in *Myrcia*) at apex, and containing 1 to few seeds. This species is further distinguished by: (1) leaves ¾–2½ inches long and ⅜–1 inch broad, mostly long-pointed at apex and short-pointed at base; (2) several stalked flowers about ⅜ inch across; and (3) reddish berries about 5/16 inch in diameter.

A small evergreen tree to 30 feet tall and 8 inches in trunk diameter, much branched and with dense bushy crown. The light brown or gray bark is smoothish. Inner bark is light brown or reddish and slightly bitter. The slender brown or light gray twigs are minutely hairy.

Leafstalks are ⅛–¼ inch long and finely hairy. Blades are turned up on both sides of midvein (not flat), slightly thickened and leathery, hairless or nearly so, above green to dark green and slightly shiny, and beneath lighter green.

The flower clusters (racemes) with slender, finely-hairy stalks are mostly ½–1 inch long, many and showy. The flower has a hairy tubular base (hypanthium) 1/16 inch long and broad, which encloses the inferior 2-celled ovary and bears 4 rounded hairy sepals 1/16 inch or less in length, 4 rounded white petals less than ⅛ inch long, numerous white stamens almost ¼ inch long, and curved style ¼ inch long. The reddish berries have the 4 sepals remaining at apex, thin edible flesh, and a large seed. In flower and fruit in spring and summer.

The sapwood is light brown and hard.

Sometimes planted as an ornamental for the showy white flowers.

Common in moist and dry limestone and lower Cordillera and Luquillo forests from sea level to 2,200 feet altitude, middle elevations in mountains and on limestone coastal hills in Puerto Rico. Also through islands eastward including Palominos, Culebra, Vieques, St. Croix, St. Thomas, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Guánica, Luquillo, Maricao, Río Abajo, Susúa, Vega.

RANGE.—Jamaica, Hispaniola, Puerto Rico and Virgin Islands, and St. Martin and Antigua in Leeward Islands. Also southern Mexico, British Honduras, Costa Rica, Panama, and from Colombia to Surinam, Brazil, Bolivia, and Peru.

OTHER COMMON NAMES.—hoja menuda (Puerto Rico); arrayán (Colombia); murta, macaguete, guayabillo rebalsero (Venezuela); pichirina (Peru); rodwood (Jamaica); murta (Brazil); escobón (Dominican Republic).

BOTANICAL SYNONYMS.—*Eugenia biflora* (L.) DC. var. *ludibunda* (Bertero) Krug & Urban and var. *lancea* (Poir.) Krug & Urban, *E. lancea* Poir.

Several varieties have been named in this widespread variable species.

562. Pitangueira

Eugenia biflora (L.) DC.

Fruits (left), flowering twig (right), natural size.

563. ***Eugenia boqueronensis* Britton**

This shrub or small tree known only from southwestern Puerto Rico is characterized by: (1) opposite ovate leaves $\frac{3}{4}$–$1\frac{1}{2}$ inches long and $\frac{3}{8}$–$\frac{1}{4}$ inch wide, tapering to a blunt point at apex, shiny green with minute blackish gland dots; and (2) small flowers about $\frac{3}{16}$ inch across the 4 rounded white petals, few on short stalks at leaf bases.

Evergreen shrub or small tree to 25 feet high. Twigs slender, gray, densely hairy when young.

The opposite leaves have petioles less than $\frac{1}{8}$ inch long, often hairy. Blades are short-pointed at base, slightly thickened, shiny green on both surfaces, hairy on midvein beneath when young but becoming hairless or nearly so, with fine side veins.

Flowers few in hairy clusters (racemes) at bases of uppermost leaves on slender stalks less than $\frac{1}{4}$ inch long. The flower has a cuplike hairy base (hypanthium) $\frac{1}{16}$ inch long, which encloses the inferior ovary and bears 4 rounded hairy gland-dotted sepals $\frac{1}{16}$ inch long, 4 rounded petals about $\frac{1}{16}$ inch long, many stamens, and pistil with inferior ovary and slender style. Collected with flowers in February. Fruit unknown.

Rare in dry limestone forest from sea level to 1,200 feet altitude in southwestern Puerto Rico.

PUBLIC FOREST.—Guánica.

RANGE.—Southwestern Puerto Rico.

This poorly known rare species is named for Salinas de Boquerón, where it was first collected by Nathaniel L. Britton and others in 1915.

563. *Eugenia boqueronensis* Britton

Flowering twig, natural size.

564. Guayabota de sierra ***Eugenia borinquensis* Britton**

Along summits of the eastern mountains of Puerto Rico this distinctive small tree is rather common. Characterized by: (1) round stiff leathery leaves, 1¼–3½ inches in diameter with minute gland dots, opposite and stalkless; (2) large spreading white 4-petaled flowers 1½–2 inches across the numerous white stamens, terminal and lateral on separate stalks; and (3) nearly round reddish green berries ¾ inch in diameter, with 4 unequal sepals remaining attached at apex. Distinguished from the closely related species No. 191, guayabota (*Eugenia stahlii* (Kiaersk.) Krug & Urban), by the leaves stalkless and round instead of short-stalked and elliptic.

An evergreen tree to 25 feet high and 8 inches in trunk diameter, or sometimes shrubby, with compact crown of dark green foliage. The bark is light brown, smoothish or becoming rough and fissured or scaly. Inner bark is reddish brown and slightly astringent. The stout twigs are light gray to reddish brown, flattened a little under leaves.

The leaves are mostly round at apex and slightly notched or heart-shaped at base, the edges turned under, the upper surface green or dark green and slightly shiny, and the lower surface paler green.

Flowers are a few together at ends of twigs or single above a leaf, on stout dark green stalks ⅜–1¼ inches long. The bell-shaped dark green base (hypanthium) ¼ inch long and bears 4 rounded concave calyx lobes tinged with dark red, 2 about ⅜ inch long and 2 half as large; there are 4 spreading rounded white petals ¾–1 inch long; numerous spreading white stamens ¾–1 inch long; and pistil with 2-celled inferior ovary and long white style ⅞ inch long. The fleshy fruits have 1–4 large brown seeds. Flowering and maturing fruit from spring to late autumn.

The sapwood is light brown. The heartwood is hard, heavy, and durable. The wood is seldom used because of the small size and relative inaccessibility of the trees.

Locally common in dwarf forest and thickets on or near the ridges and peaks in upper Luquillo and Cordillera forests at 2,500–3,500 feet altitude in Puerto Rico. Abundant near Mount Britton and El Yunque. Also in eastern Cordillera at Sierra de Cayey.

PUBLIC FORESTS.—Carite, Luquillo.

RANGE.—Known only from eastern mountains of Puerto Rico.

OTHER COMMON NAME.—guayabota (Puerto Rico).

BOTANICAL SYNONYM.—*Eugenia sintenisii* (Kiaersk.) Krug & Urban, not Kiaersk.

564. Guayabota de sierra *Eugenia borinquensis* Britton

Flowering twig (left), fruiting twig (right), two-thirds natural size.

565. Cienaguillo, redberry eugenia ***Eugenia confusa* DC.**

This species of western mountains in Puerto Rico is distinguished by: (1) opposite ovate to lanceolate shiny leaves slightly thick and stiff, ending in vary long point, often curved; (2) flowers about 3/8 inch across the 4 spreading white petals, several or 1 at leaf bases on threadlike stalks 1/2–1 inch long; and (3) rounded orange to scarlet berries 1/4 inch in diameter, with 4 calyx lobes at apex.

An evergreen small tree to 20 feet high and 3 inches in trunk diameter or sometimes medium-sized tree to 40 feet tall and 1 foot in diameter, with rounded spreading crown. The bark is gray, rough and deeply furrowed or scaly, the inner bark light brown and bitter. Twigs are slender, hairless, light green when young, turning gray.

Leaves opposite, hairless, with slender light green petioles 1/4–3/8 inch long. Blades are variable in shape, 1 3/4–3 inches long and 3/4–1 1/2 inches wide, with very long point, often curved at apex, short-pointed or blunt at base, not toothed on edges, the side veins inconspicuous, with minute gland dots, the upper surface dark green to yellow green and shiny, and the lower surface dull light green.

Flowers spreading from node on threadlike stalks of equal length (like umbels). The conical base (hypanthium) nearly 1/8 inch long bears the 4 rounded light green calyx lobes 1/16 inch long; 4 rounded white petals 1/8 inch long; many spreading threadlike stamens; and pistil with inferior 2-celled ovary and slender style. The fruits are 1-seeded. Flowering and fruiting from spring to autumn.

The wood is light brown, hard, heavy, and durable. It has served for stakes and posts and as a cabinetwood in Florida.

The trees are planted as ornamentals in southern Florida, where native.

Locally common in moist limestone and upper and lower Cordillera forests at 300–2,500 feet altitude in western mountains of Puerto Rico. Reported from Virgin Islands long ago, apparently in error.

PUBLIC FORESTS.—Guajataca, Maricao, Susúa.

RANGE.—Southern Florida including Florida Keys, Bahamas, Cuba, Jamaica, Hispaniola, Puerto Rico, Guadeloupe, Dominica, and Trinidad (?).

OTHER COMMON NAMES.—caracolillo (Puerto Rico); yarua (Cuba); redberry eugenia, red stopper, snakewood, ironwood (United States); ironwood (Bahamas); wild coffee (Trinidad); jayao (Dominican Republic).

565. Cienaguillo, redberry eugenia *Eugenia confusa* DC.

Fruiting twig (above), twig with old flowers (lower right), natural size.

566. Lathberry ***Eugenia cordata* (Sw.) DC.**

This shrub or small tree is easily recognized by its leaves. Distinguishing characters are: (1) paired elliptic leaves ¾–2 inches long and ½–1½ inches broad, rounded at apex, stalkless and slightly notched or heart-shaped and clasping at base; (2) small white flowers less than ¼ inch across the many stamens, clustered and stalkless at leaf bases and at nodes back of leaves; and (3) stalkless fruits about ¼ inch long.

An evergreen shrub or small tree 30 feet in height and 5 inches in trunk diameter, with smooth gray bark. The slender twigs are light gray or brown, minutely hairy when young.

The opposite leaves commonly are ¾–1 inch long but sometimes twice as large, slightly thickened, hairless, shiny green above and dull light green beneath, the border yellow and slightly turned under, with inconspicuous veins and with minute gland dots.

The crowded clusters of stalkless flowers consist of calyx of 4 rounded sepals 1/16 inch long, 4 rounded white petals less than ⅛ inch long, many threadlike white stamens, and pistil with inferior ovary 1/16 inch long and threadlike style. The fruit is rounded to elliptic, greenish, about ¼ inch long. With flowers and fruits in spring.

Common in eastern Puerto Rico and rare along south coast to upper Coamo, moist and dry coastal and lower Cordillera forests from sea level to 1,800 feet altitude. Also common on islands eastward, forming thickets on hillsides, Piñeros, Culebra, St. Croix, St. Thomas St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC PARK.—Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands and Lesser Antilles from St. Eustatius to Guadeloupe and Dominica.

567. ***Eugenia* (?) *corozalensis* Britton**

Described as a tree 20 feet high with slender hairless twigs slightly enlarged below forks. Leaves opposite, stalkless, elliptic rounded, 1¾–2¾ inches long and 1¾–2 inches wide, thin, hairless, rounded at apex, heart-shaped at base, green on both surfaces, densely gland dotted, the slender veins forming loose network. Flowers and fruits unknown. Collected only at limestone hill, Corozal, Puerto Rico. This species was named by Nathaniel L. Britton in 1924 from his sterile specimen of 1923 doubtfully in this genus, and has not been studied further.

566. Lathberry *Eugenia cordata* (Sw.) DC.

Flowering twig (left), fruiting twig (right), natural size.

568. Guasábara ***Eugenia eggersii* Kiaersk.**

Guasábara, a shrub or small tree restricted to mountain forests of Puerto Rico, is identified by: (1) opposite oblong to narrowly elliptic leaves 2–6 inches long and ¾–2¼ inches wide, hairless, slightly thickened, leathery, dark green and slightly shiny on upper surface; (2) white flowers nearly ½ inch across the 4 petals and many spreading stamens, several in short clusters at leaf bases; and (3) round warty fruit ½ inch in diameter, with 4 rounded sepals at apex.

An evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter, reported to become a tree 65 feet tall. Bark gray, smooth to finely fissured, the inner bark greenish. Twigs slender, green, turning brown, hairless.

Leaves opposite, hairless, with petioles ⅛–⅜ inch long. Blades mostly long-pointed at apex, short-pointed or blunt at base, not toothed on edges, the lower surface yellow green and slightly shiny.

Flower clusters (racemes) at leaf bases are ½–1½ inches long. The fragrant flowers on stalks ⅛–¼ inch long have a cup-shaped green base (hypanthium) 1/16 inch long, which bears 4 light green rounded sepals ⅛ inch long; 4 rounded white petals 3/16 inch long; many white spreading threadlike stamens ⅜ inch long; and pistil with inferior 2-celled ovary containing many ovules and slender style. Flowering in spring and summer and fruiting in summer.

The wood is light brown and hard.

Rare as understory shrub or small tree in moist limestone, Luquillo, and Cordillera forests at 1,000–3,000 feet altitude in mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guajataca, Luquillo, Río Abajo, Toro Negro.

RANGE.—Known only from mountains of Puerto Rico.

OTHER COMMON NAME.—guayabacón (Puerto Rico).

This species was first collected by Henrik Franz Alexander von Eggers (1844–1903) Danish army captain and plant collector, in Luquillo Mountains in 1883.

569. ***Eugenia glabrata* (Sw.) DC**

This shrub or small tree has been found at Maricao Forest by Alain Liogier. Characterized by: (1) twigs finely hairy when young; (2) opposite elliptic to ovate leaves 1½–3 inches long and ½–1¼ inches wide, thin, hairless, the apex long-pointed with blunt tip, base rounded or short-pointed, with side veins conspicuous, with gland dots, and petioles ⅛–¼ inch long; (3) few flowers 3/16 inch long in clusters to ½ inch long at leaf bases; and (4) oblong black berries ⅜–½ inch long. Rare at Maricao State Forest. RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico. OTHER COMMON NAMES.—cuairaje colorado (Cuba); rodwood (Jamaica); arrayan (Dominican Republic).

568. Guasábara *Eugenia eggersii* Kiaersk.

Flowering twig (left), fruiting twig (right), natural size.

570. Uvillo ***Eugenia haematocarpa*** **Alain**

This rare small tree known only from Luquillo Mountains was not named until 1963. Its distinguishing characters are: (1) paired, relatively large, oblong to elliptic leaves, thick and leathery, almost stalkless; (2) many small flowers about 1/4 inch wide, borne short-stalked in clusters on trunk; and (3) round berries, 3/4 inch in diameter, dark blood red, edible.

An evergreen small tree to 25 feet high and 6 inches in trunk diameter. Bark gray or whitish, smoothish shedding in plates. Twigs hairless, slightly 2-angled, rusty brown.

Leaves opposite, hairless, with short petioles less than 1/8 inch long. Blades are mostly 4–7 inches long and 2–3 1/2 inches wide, thin, long-pointed at apex, rounded or slightly notched at base, not toothed on edges, with many nearly straight slender side veins slightly raised and forming prominent network, dull dark green on upper surface, and light green beneath.

Flowers many in clusters on trunk on slender nearly equal stalks of 1/8–1/2 inch, composed of bell-shaped tube (hypanthium) 1/16 inch long, finely hairy, calyx of 4 rounded lobes 1/16 inch long, 4 rounded light pink petals 1/8 inch long, many stamens, and pistil with inferior ovary. Berries round or nearly so, dark blood red, containing 1 rounded light brown seed 5/8 inch in diameter. Collected with flower buds and fruits in May.

Rare in lower slopes of Luquillo forest at 1,000–1,500 feet altitude in Luquillo Mountains, colected at Barrio Maizanales, El Valle, Naguabo, and at El Verde, Río Grande.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquillo Mountains of eastern Puerto Rico.

This striking species was first collected in 1939 by Leslie R. Holdridge, of the U. S. Forest Service. The scientific name refers to the blood red color of the fruits, which are large and edible.

570. Uvillo

Eugenia haematocarpa Alain

Leafy twig and fruits (lower left), two-thirds natural size.

571. Palo de muleta ***Eugenia ligustrina*** **(Sw.) Willd.**

This uncommon shrub or elsewhere a small tree is recognized by: (1) paired, narrowly elliptic leaves ¾–1¾ inches long and ¼–¾ inch wide, very shiny green above; (2) smaller scalelike leaves at base of twigs; (3) flowers mostly single on slender stalks back of leaves, white, ½–¾ inch across the 4 white petals; and (4) round red berries ¼–5/16 inch in diameter, with 4 long narrow sepals at apex, sweetish and edible.

An evergreen shrub seldom taller than 8 feet but sometimes a tree 12 feet high and 3 inches in trunk diameter, reported to reach 15–20 feet elsewhere, hairless throughout. Bark gray, slightly fissured to peeling and slightly shaggy. The twigs are slender, light gray brown. The narrow pointed buds are up to 3/16 inch long, 4-angled, and covered with overlapping pointed scales.

The opposite leaves have short slender yellowish petioles less than 3/16 inch long. Blades are blunt or short-pointed at apex and short-pointed at base, turned under at edges, slightly thick and leathery with sunken midvein and many faint side veins, covered with minute gland dots, and dull yellow green beneath.

Flowers mostly single back of leaves on slender stalks of 1½ inches. Sepals 4, 3/16 inch long, gland-dotted; petals 4, white, about ⅜ inch long; stamens many; and pistil with inferior ovary containing many ovules and with slender style. Berries on slender stalks are covered with gland dots and have few rounded seeds. Recorded with flowers in May.

The sweetish edible berries have been made into preserves elsewhere.

Uncommon and scattered mostly in dry and moist limestone forests of southern and western Puerto Rico, also scattered along north coast to Fajardo in northeast, from sea level to 600 feet altitude. Also in Piñeros, Culebra, Vieques, St. Croix, St. Thomas, St. John, and Jost Van Dyke.

PUBLIC FORESTS.—Cambalache, Guajataca, Guánica, Vega; Virgin Islands.

RANGE.—Greater Antilles, Virgin Islands, Lesser Antilles from St. Martin and St. Barts to Trinidad and Tobago. Also from Venezuela south to Brazil. Planted in South Florida.

OTHER COMMON NAMES.—granadilla, hoja menuda, palo de murta (Puerto Rico); arraiján (Cuba); birchberry (English); mérisier (St. Barts); blackberry, black-cherry (St. Martin, St. Eustatius); bois ti-feuilles, mérisier noir (Martinique) arrayán, escobón de aguja (Dominican Republic).

BOTANICAL SYNONYM.—*Stenocalyx ligustrinus* (Sw.) Berg.

571. Palo de muleta *Eugenia ligustrina* (Sw.) Willd.

Flowering twig (upper left), fruiting twig (right), twig with old fruit stalks (below), natural size.

572. Anguila, boxleaf eugenia ***Eugenia foetida* Pers.**

This common shrub or small tree of the group of hoja menuda is distinguished by: (1) unpleasant, skunklike odor of foliage; (2) leaves paired, small, oblanceolate, narrow, rounded at apex, mostly broadest beyond middle and tapering to long-pointed base, almost stalkless; (3) few small white flowers 3/16 inch across the many white stamens, clustered and almost stalkless at leaf bases and back of leaves; and (4) rounded blackish berries about 1/4 inch in diameter.

A shrub or small tree to 20 feet high and 4 inches in trunk diameter, on Desecheo reaching 30 feet and 5 inches. Bark gray, smooth, becoming slightly fissured or mottled into large plates. Inner bark pink, slightly bitter. Twigs gray, slender, often finely hairy.

The opposite leaves 3/4–1 1/2 inches long and 1/4–1/2 inch wide are hairless, slightly thickened and turned under at edges, dull or slightly shiny green above, and beneath light green with blackish gland dots. The leaves vary greatly in shape and size.

Flowers few, slightly fragrant, consisting of 4 rounded calyx lobes more than 1/16 inch long, 4 white gland-dotted petals less than 1/8 inch long, many threadlike white stamens, and pistil with inferior ovary and long slender style. The fruits turn from yellow orange to black or dark brown at maturity and have calyx at apex. Seed usually 1, sometimes 2. Flowering and fruiting in spring and summer, the fruits persisting.

The heartwood is dark reddish brown and the sapwood light brown. The wood is hard, heavy, and fine-grained.

Common in moist and dry limestone forests from sea level to 300 feet altitude in southwestern coast and foothills of Puerto Rico. Also, Mona, Desecheo, Muertos. Through the islands eastward, including Vieques, St. Croix, St. Thomas, and Tortola.

PUBLIC FORESTS.—Cambalache, Guánica, Estate Thomas.

RANGE.—Bahamas, Greater Antilles, and Virgin Islands. Also southern Florida including Florida Keys. Recorded from southern Mexico and Guatemala.

OTHER COMMON NAMES.—hoja menuda (Puerto Rico); escobón (Dominican Republic); guairaje, guairaje blanco, bálsamo (Cuba); rodwood (Jamaica); stopperbush, Spanish stopper (Bahamas); boxleaf eugenia, gurgeon stopper, Spanish stopper (United States); bois petites feuilles (Haiti).

BOTANICAL SYNONYMS.—*Eugenia buxifolia* (Sw.) Willd. not Lam., *E. myrtoides*, E. *maleolens* of authors, not Pers.

This species apparently is one of the commonest and most widespread of its family in the Greater Antilles. It was long known as *Eugenia buxifolia*, a name rejected as a later homonym.

572. Anguila, boxleaf eugenia *Eugenia foetida* Pers.

Flowering twig (upper left), fruiting twig (lower right), natural size.

573. Birijí, black-cherry *Eugenia monticola* (Sw.) DC.

Birijí is common and widely distributed in Puerto Rico, mainly western part, and through the Virgin Islands. It is recognized by: (1) many twigs very slender and wandlike, finely hairy; (2) many crowded small leaves paired and in 2 rows, lance-shaped to narrowly ovate, pointed at both ends and often strongly turned under toward base; (3) many white flowers about 3/16 inch wide, crowded on short stalks at leaf bases; and (4) fruit a round berry 3/16 inch in diameter, turning from red to black at maturity.

An evergreen shrub or tree to 50 feet high and 6 inches in trunk diameter. Bark gray, smooth to slightly fissured, the inner bark brown and almost tasteless. Twigs very slender, light brown, finely hairy when young.

Leaves opposite in 2 rows, with slender finely hairy petioles less than 1/8 inch long. Blades 5/8–1 1/4 inches long and 3/16–1/2 inch wide (up to 7/8 inch wide in a broadleaf form), the apex ending in a long blunt point, the base short- or long-pointed and may be strongly turned under, edges not toothed, thin or a little thickened, hairless or nearly so, with minute gland dots, dull green above, paler beneath. The foliage sometimes has an unpleasant, skunklike odor.

The flowers are composed of 4 rounded sepals 1/16 inch long, 4 white petals less than 1/8 inch long and gland dotted, many threadlike white stamens, and pistil with inferior ovary and slender style. The fruits, with sepals persistent at apex, are classed as edible. Flowering and fruiting irregularly from spring to fall.

Wood light brown, hard, and heavy.

Common and widely distributed in moist and dry limestone and upper Cordillera forests from sea level to 2,500 feet altitude, mainly in western Puerto Rico. Also in Muertos, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guánica, Maricao, Río Abajo, Susúa, Vega; Virgin Islands, Gorda Peak.

RANGE.—Greater Antilles, Virgin Islands, and through Lesser Antilles from St. Martin and St. Barts to Grenada, Barbados, and Trinidad and Tobago. Also from Venezuela to French Guiana. Recorded from Guatemala.

OTHER COMMON NAMES.—hoja menuda (Puerto Rico); arrayán, escobón blanco (Dominican Republic); guairaje macho (Cuba); rodwood (Jamaica, Barbados); white rodwood (Barbados); small-leaf (Trinidad and Tobago); petit bois d'Inde (Haiti); birds-cherry (St. Martin); mérisier (St. Barts); petits feuilles, mérisier ti-feuilles (Guadeloupe); ti-feuilles, bois créole (Martinique).

573. Birijí, black-cherry *Eugenia monticola* (Sw.) DC.

Flowering twig (left), fruiting twig (right), natural size.

574. Hoja menuda ***Eugenia procera*** **(Sw.) Poir.**

This species of hoja menuda found in dry forests of southwestern Puerto Rico and the islands eastward is characterized by: (1) opposite ovate to elliptic leaves 1–2 inches long and $\frac{5}{8}$–$1\frac{1}{4}$ inches wide, slightly thickened; (2) white flowers about $\frac{3}{8}$ inch across the many stamens and 4 petals, several on very slender stalks $\frac{1}{4}$–$\frac{5}{8}$ inch long at nodes; and (3) rounded black sticky berries nearly $\frac{1}{4}$ inch in diameter.

An evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter. Bark gray, smooth, peeling off in rectangular plates. Twigs slender, finely hairy when young.

Leaves opposite, with petioles about $\frac{1}{8}$ inch long. Blades are bluntly long-pointed at apex, short-pointed at base, not toothed on edges, hairless, with minute gland dots, with inconspicuous veins forming a fine network, the upper surface dull green, and the lower surface paler.

The fragrant flowers are borne several at a node at base of a leaf on stalks of equal length (like an umbel). The cup-shaped base (hypanthium) bears 4 rounded calyx lobes less than $\frac{1}{8}$ inch long and, the other parts; 4 white petals more than $\frac{1}{8}$ inch long; many threadlike stamens about $\frac{1}{8}$ inch long; and pistil with inferior 2-celled ovary and style. Flowers and fruits produced from spring to autumn.

Rare in dry limestone forest of southwestern Puerto Rico, collected at San Germán, also Coama Springs, and in northeastern part near Toa Baja and Fajardo. Also St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC PARK.—Virgin Islands.

RANGE.—Greater Antilles, Virgin Islands, and through Lesser Antilles from St. Martin to Martinique, Barbados, Trinidad, and Curacao. Also Venezuela and Colombia.

OTHER COMMON NAMES.—arrayán colorado lobo (Dominican Republic); arrayán, guayabito arrayán (Colombia).

574. Hoja menuda

Eugenia procera (Sw.) Poir.

Flowering twig (upper left), fruiting twig (lower right), natural size.

575. Quiebrahacha ***Eugenia pseudopsidium* Jacq.**

This shrub rarely reaching tree size at Vieques is identified by: (1) opposite ovate to elliptic leaves 1½–4½ inches long and ¾–2 inches wide, hairless, the upper surface green and slightly shiny; (2) whitish flowers about ⅜ inch wide, 1 or few on long very slender stalks at leaf bases; and (3) the conspicuous rounded shiny red or yellow berries ⅜–⅝ inch in diameter with calyx lobes at apex.

An evergreen shrub flowering when only 3 feet high, rarely a small tree at Vieques. Bark light gray, slightly fissured and scaly. Twigs slender, minutely hairy, green when young, turning brown.

The opposite hairless leaves have short petioles ⅛–¼ inch long. Blades are long-pointed at apex, short-pointed at base, not toothed on edges, slightly thickened, the lower surface dull light green.

Flowers are borne 1 or few on stalks ⅜–1 inch long at leaf bases or sometimes at end of twig. The cup-shaped green base (hypanthium) 1/16 inch long encloses the inferior ovary and bears the 4 rounded greenish calyx lobes about ⅛ inch long and other parts; 4 rounded white petals ⅛–¼ inch long; many white stamens; and pistil with inferior 2-celled ovary containing many ovules and slender style. The rounded fruits have calyx persistent at apex and contain 1 rounded seed. Flowering and fruiting probably irregularly through the year.

Wood light or reddish brown, hard, reported to be very heavy (specific gravity 1.3).

Uncommon in moist coastal forest at low and middle altitudes to 2,200 feet in Puerto Rico. Also other islands, including Vieques, St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC FORESTS AND PARK.—Cambalache, Guajataca, Maricao, Río Abajo, Vega; Virgin Islands.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, Montserrat, Guadeloupe, Dominica, Martinique, and St. Vincent (doubtfully Barbados).

OTHER COMMON NAMES.—guayaba silvestre (Puerto Rico); wild guava (Virgin Islands); goyavier de montague (Guadeloupe); goyavier-bois, bois plié, goyavier marron (Martinique); guásara (Dominican Republic).

575. Quiebrahacha

Eugenia pseudopsidium Jacq.

Flowering twig (upper left) and fruiting twig, natural size.

576. Serrazuela ***Eugenia serrasuela*** **Krug & Urban**

Described as a tree with chinked bark and hairless twigs. Leaves opposite with petioles ¼ inch long, ovate, to 5 inches long and 2½ inches wide, bluntly long-pointed, curved down on edges, thick, gland dotted, with conspicuous veins. Flowers clustered at ends of twigs, almost stalkless, 5-parted, with ovate sepals and half-round woolly inferior ovary. Fruit a round berry 1 inch in diameter, hairy, ribbed, containing 1 seed. Reported from Anones, Puerto Rico, by Bello before 1881 and not collected afterwards.

577. ***Eugenia sessiliflora*** **Vahl**

This shrub or small tree is more widely distributed through the islands eastward than in Puerto Rico. Its characters for identification are: (1) opposite elliptic or nearly round leaves, thick and leathery, with edges much rolled under; (2) stalkless flowers clustered on twigs back of leaves, about ½ inch across the many spreading threadlike stamens and 4 petals; and (3) round rose-colored berries about ¾ inch in diameter.

An evergreen shrub or rarely a small tree to 15 feet high and 3 inches in trunk diameter, hairless throughout. Bark gray, smooth. Twigs stout, light gray.

Leaves opposite, with stout yellow to brown petioles ⅛–¼ inch long. Blades are mostly 1⅝–3 inches long and 1¼–2¼ inches wide, sometimes to 4 by 3 inches, rounded or blunt at apex, short-pointed or blunt at base, with minute gland dots, the upper surface shiny yellow green with network of fine veins visible when dry, and the lower surface dull light green.

The flowers are composed of brownish hairy cup-shaped base (hypanthium) ⅛ inch long, which bears the calyx with 4 yellow-green dotted lobes ⅛–3/16 inch long and the other parts; 4 petals ¼ inch long; many threadlike stamens; and pistil with inferior 2-celled ovary and slender style. Flowering and fruiting in spring and early summer.

Uncommon in moist coastal forest from sea level to 1,000 feet altitude. In Puerto Rico only at Cabeza de San Juan and vicinity of Fajardo at the northeastern corner, south of Cayey at 1,800 feet altitude, and between Aibonito and Coamo. Also Vieques, Culebra, St. Croix, St. Thomas (Water Island), Tortola, and Virgin Gorda.

RANGE.—Known only from Puerto Rico and Virgin Islands.

Named from St. Croix in 1794 but not found in Puerto Rico until 1954.

577. *Eugenia sessiliflora* Vahl

Flowering twig (left), fruiting twig (lower right), natural size.

578. Murta ***Eugenia sintenisii*** **Kiaersk.**

This shrub or small tree is identified by: (1) paired, elliptic to obovate leaves narrowed at base, short-stalked; (2) small flowers about $\frac{3}{16}$ inch across the many stamens, stalkless in clusters back of leaves or at leaf bases; and (3) rounded red fruits, $\frac{3}{16}$ in diameter.

An evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, hairless throughout. Leaves opposite with petioles less than $\frac{1}{8}$ inch long. Blades $1\frac{1}{2}$–3 inches long and $\frac{3}{4}$–$1\frac{1}{2}$ inches wide, blunt or rounded at apex and narrowed or short-pointed at base, dark green with whitish midvein, slightly thickened.

The flowers have calyx lobes less than $\frac{1}{16}$ inch long, rounded petals less than $\frac{1}{8}$ inch long, many threadlike stamens, and pistil with inferior ovary and long slender style. Flowering and fruiting in spring.

Rare in upper Cordillera forest at 2,500–3,000 feet altitude in eastern and central mountains of Puerto Rico. Recorded also from St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC FORESTS.—Carite, Toro Negro.

RANGE.—Puerto Rico and Virgin Islands, also Lesser Antilles from St. Eustatius, Barbuda, and Antigua to St. Vincent and The Grenadines.

Related to No. 566 lathberry, *Eugenia cordata* (Sw.) DC., which has leaves rounded or slightly heart-shaped at base, and regarded also as a variety of that species (*E. cordata* var. *sintenisii* (Kiaersk.) Krug & Urban).

578. Murta

Eugenia sintenisii Kiaersk.

Flowering twig, natural size.

579. ***Eugenia stewardsonii* Britton**

This rare tree known only from Puerto Rico is described by: (1) paired ovate shiny green leaves almost stalkless, with prominent network of veins; (2) many stalkless white flowers nearly ¼ inch across the many stamens, crowded on twigs below leaves; and (3) rounded fruits ¼ inch in diameter.

A small evergreen tree 15–30 feet high and 4 inches in trunk diameter, hairless throughout. Twigs slender, gray.

Leaves opposite, almost stalkless, 1¼–2¼ inches long and ¾–1½ inches wide, slightly thickened, blunt or rounded at apex, rounded or slightly notched at base, not toothed on edges, ovate to elliptic, bright shiny green on both sides, with many straight fine side veins prominent in drying.

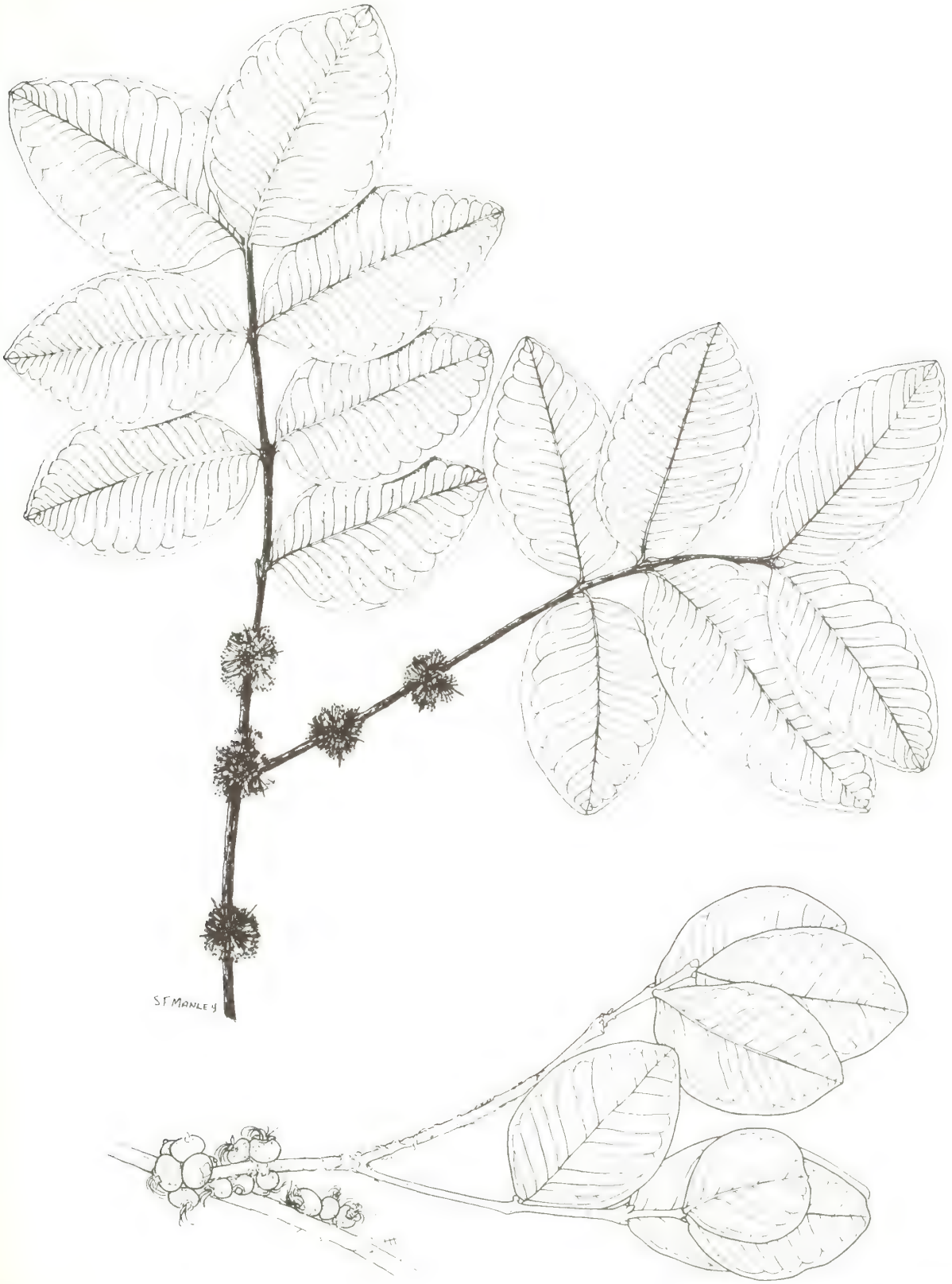
Flowers stalkless, crowded in clusters below leaves. The flower has 4 rounded greenish calyx lobes less than ⅛ inch long, with gland dots; 4 white petals; many spreading threadlike white stamens; and pistil with inferior ovary and long style. The stalkless berries have calyx lobes at apex. Flowering and fruiting in spring.

Rare in upper Cordillera forest at about 2,500–3,000 feet altitude in western mountains of Puerto Rico.

PUBLIC FORESTS.—Guilarte, Maricao.

RANGE.—Puerto Rico only.

This species honors Stewardson Brown (1867–1929), botanist of the United States, who assisted Nathaniel L. Britton in collecting the type specimen at the summit of Monte Torrecillo in 1915.



579. *Eugenia stewardsonii* Britton

Flowering twig (above), fruiting twig (below), natural size.

580. Cereza de Cayena, Surinam-cherry ***Eugenia uniflora* L.***

Surinam-cherry is an introduced shrub or small tree planted for its edible cherrylike fruits and for hedges. It is identified by: (1) opposite ovate leaves 1¼–2¼ inches long and ¾–1¼ inches wide, shiny dark green and slightly curved, with few side veins; (2) flowers about ⅜ inch across the 3 spreading petals, white or tinged with pink, 1–4 at leaf bases on long slender stalks; and (3) rounded berries ½–1 inch in diameter, red to deep purplish black, grooved or angled, resembling tiny tomatoes, juicy and slightly sour, 1-seeded.

A planted shrub or small tree to 15 feet high and 4 inches in trunk diameter, much branched, hairless. Twigs light brown, slender.

The opposite hairless leaves have light green petioles ¼ inch long. The blades are bluntly long-pointed at apex, rounded or slightly notched at base, not toothed on edges, slightly thickened, slightly curved and convex from base to apex, with minute gland dots, shiny dark green on upper surface, and dull light green beneath.

Flowers borne on slender stalks ½–1¼ inches long are composed of calyx with 4 light green lobes 3/16 inch long, turned back and persistent; 4 spreading elliptic petals 5/16 inch long, white or tinged with pink, soon falling; many threadlike white stamens 3/16 inch long; and pistil with inferior rounded ovary 1/16 inch long and threadlike white style. The fruits are broader than long, with 8 vertical ridges and grooves and with 1 large seed. A variety has purplish black fruits. With flowers and fruits in spring.

The cherrylike fruits are eaten raw and made into jellies and preserves. The shrubs can be pruned into attractive hedges with glossy dark green foliage. In temperate climates the plants in pots bear many showy fruits. It is reported that a home remedy like tea has been prepared from the leaves.

Rarely grown for the pleasantly acid fruits, also for hedges, in Puerto Rico, St. Croix, and St. Thomas and reported to spread from seeds.

RANGE.—Native from Brazil and Guianas to Uruguay, Argentina, and Bolivia. Widely planted through tropical America north to Bermuda, Bahamas, southern Florida, southern Texas, and southern California. Spreading from cultivation. Also introduced into the Old World tropics.

OTHER COMMON NAMES.—cereza de Surinám (Puerto Rico); cereza de Cayena, pitanga (Spanish); guinda (El Salvador); ñangapiré (Uruguay); ñangapirí, arrayán (Argentina); Surinam-cherry, pitanga, Brazil-cherry, Cayenne-cherry, Florida-cherry (English); cerise de Cayenne (French); honeyberry, Surinam-cherry (Saba, St. Eustatius); pitanga, pitangueira (Brazil); grosela de México. (Dominican Republic).

580. Cereza de Cayena, Surinam-cherry *Eugenia uniflora* L.*

Flowering twig (left), twig with immature fruits (right), natural size.

581. ***Eugenia xerophytica* Britton**

This rare shrub or small tree known only from southwestern Puerto Rico and Muertos is characterized by: (1) opposite nearly round leaves, slightly thick and leathery, with prominent network of veins; (2) white flowers 5/8 inch across the many spreading threadlike stamens and 4 petals, 1 to few on slender stalks 1/4–1/2 inch long at nodes, mostly back of leaves; and (3) egg-shaped or rounded berries more than 3/8 inch long, with 4 enlarged calyx lobes at tip.

An evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter, much branched. Bark brown, smooth, peeling off in plates and mottled, the inner bark whitish and tasteless. Twigs slender, brownish gray.

Leaves opposite, hairless, with short petioles 1/8–1/4 inch long. Blades are 5/8–2 inches long and broad, rounded or blunt at apex, slightly notched or rounded at base, not toothed on edges, with minute gland dots, the upper surface shiny yellow green, often curved up on both sides, dull yellow green.

The flowers are composed of cup-shaped base (hypanthium) 1/16 inch long, which bears 4 rounded or pointed gland-dotted calyx lobes 1/8 inch long and the other parts; 4 white elliptic rounded petals more than 1/4 inch long; many threadlike white stamens 1/4–5/16 inch long; and pistil with inferior ovary containing many ovules and slender white style 1/4 inch long. The fruits are green when immature and contain few seeds. Flowering and fruiting in spring, collected also with immature fruits in July and with flowers in October.

The wood is light brown and hard.

Rare in dry limestone forest from sea level to 200 feet altitude in southwestern Puerto Rico, also Muertos.

PUBLIC FOREST.—Guánica.

RANGE.—Known only from southwestern Puerto Rico and Muertos.

OTHER COMMON NAME.—guayabacón (Puerto Rico).

This species was named in 1924 from incomplete specimens collected at Muertos in 1905 by Nathaniel L. Britton and others. The flowers are described here from a specimen collected in 1940. The scientific name xerophytic, or dry plant, describes this species adapted to dry areas.

581. *Eugenia xerophytica* Britton

Flowering twig (left), fruiting twig (upper right), natural size.

582. Cieneguillo ***Gomidesia lindeniana* Berg**

Small tree of mountain forests and dwarf forests of mountain peaks, easily recognized by the paired very convex elliptic leaves, minutely gland-dotted, curved from the short-pointed base to the long-pointed apex and much turned under at edges. Other distinguishing characters are: (1) twigs, leafstalks, buds, branches of flower clusters, and flowers all densely brown hairy; (2) many white 5-parted flowers 3/8 inch across in branched clusters; and (3) round black berry 1/2 inch or less in diameter with calyx at apex. Resembling the related species also known as cienguillo (No. 192, *Myrcia deflexa* (Poir.) DC.), which has brown hairy parts and similar shaped leaves but nearly flat, also larger flowers and smaller berries about 1/4 inch wide.

A small evergreen tree 15–30 feet tall and 3–6 inches in trunk diameter, or sometimes shrubby. The crown is narrow or open, with few branches. The bark is gray and smooth, becoming slightly fissured. Inner bark is pink to brown and slightly astringent or bitter.

Leafstalks of the opposite leaves are 1/8–3/8 inch long and stout. The blades are 2–6 inches long and 1–3 inches broad, thickened and leathery, above shiny green to dark green and hairless or nearly so, with lateral veins slightly sunken, and beneath yellow green or brownish green and soft hairy with raised, brown hairy veins.

Flower clusters (panicles) are wide, 2–6 inches long and broad, terminal and lateral near apex of twig, bearing many nearly stalkless flowers on the densely brown hairy branches. The slightly fragrant flowers have a broad brown hairy base (hypanthium) 1/16 inch long, which encloses the inferior ovary and bears 5 pointed broad hairy brown sepals 1/16 inch long, 5 rounded white gland-dotted petals 1/8–1/4 inch long and hairy outside, numerous spreading white stamens 3/16–5/16 inch long, and slender white hairy style 1/4–3/8 inch long. The black berry is shiny and slightly brown hairy at maturity with astringent light brown flesh. Observed in flower and fruit from spring to early fall.

The light brown wood is hard.

Rare in upper Cordillera and dwarf forests at higher altitudes of 2,000–3,000 feet including summits in central and western mountains of Puerto Rico.

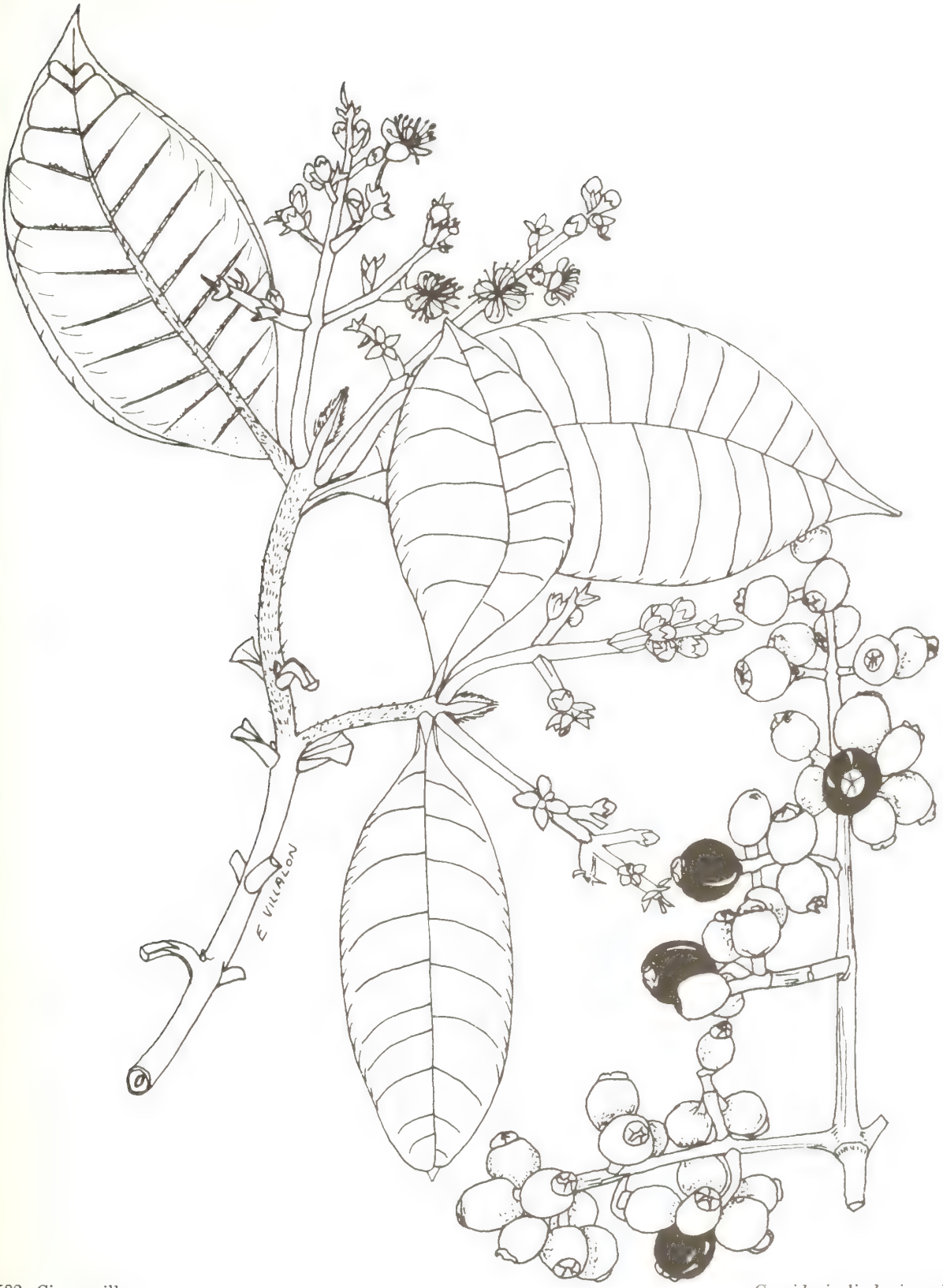
PUBLIC FORESTS.—Carite, Guilarte, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, St. Kitts, Montserrat, Guadeloupe, Dominca, and Martinique. Also the same or a closely related species in South America to Brazil.

OTHER COMMON NAMES.—auguey, auguey prieto, auguey blanco (Dominican Republic); yareicillo (Cuba); mérisier grandes feuilles (Guadeloupe).

BOTANICAL SYNONYMS.—*Myrcia lindeniana* (Berg.) Kiaersk., *M. fenzliana* Berg.

The specific name honors Jean Jules Linden (1817–1898), of Belgium, who made extensive plant collections in the New World, including the type of this species in Cuba.



582. Cieneguillo *Gomidesia lindeniana* Berg

Flowering twig (left) and fruits (right), natural size.

583. Cayeputi, cajeput-tree ***Melaleuca quinquenervia*** **(Cav.) S. T. Blake***

The cajeput-tree, an introduced ornamental, is easily recognized by its odd whitish corky or spongy thick bark, which splits and peels in many papery layers, exposing light pink or brown beneath and becoming rough and shaggy. Other distinguishing characters are: (1) lance-shaped or narrowly elliptic leaves dull gray green with 5 (sometimes 7) veins (as specific name indicates) from base to apex, faint and nearly parallel, with resinous odor and taste when crushed; (2) many white flowers ⅝ inch long, crowded and stalkless in masses 1–3 inches long and 1½ inches across the mass of threadlike whitish stamens, which suggest a bottlebrush; and (3) many crowded gray-brown short hard cylindric seed capsules ⅛ inch long and 3/16 inch wide.

An evergreen resinous ornamental tree 50 feet high, the trunk 1 foot in diameter, slightly angled and grooved, with main axis and irregular branches forming narrow or open crown. Bark or trunk and branches is whitish and papery. The inner bark is composed of many light pink fibrous layers, light brown within, slightly sour. Twigs are slender, often drooping, light brown, and finely hairy when young, turning gray. End and side buds rounded to cylindric, ⅛–¼ inch long, greenish brown, composed of many rounded overlapping scales.

The alternate leaves have finely hairy light green petioles ⅛ inch long. Blades are 1½–3½ inches long and ¼–⅝ inch wide, long-pointed at both ends, not toothed on edges, slightly thickened and stiff, finely hairy and slightly paler on lower surface. Crushed leaves have a resinous odor and taste somewhat like that of eucalyptus.

The flowers are borne along twigs between groups of leaves or below. The calyx has 5 half-round lobes less than 1/16 inch long; there are 5 concave whitish petals nearly ⅛ inch long; about 30 threadlike white stamens nearly ⅝ inch long, slightly united at base and to petals and falling together promptly; and pistil with inferior 2–4-celled ovary containing many ovules, long threadlike white style, and brown dot stigma. The seed capsules are crowded and stalkless in groups 1–3 inches long on gray twigs back of leaves or between groups of leaves. There are many minute, very narrow brown seeds less than 1/16 inch long. Flowering from spring to fall, more than once a year, the fruits persistent.

The sapwood is light brown and hard.

Uncommon as an ornamental and shade tree near sea level in Puerto Rico. Fast growing and resistant to wind, drought, fires, and salt water. Suitable for windbreaks and beach planting. Elsewhere the bark has been used for packing fruits and for roofs and boats. Cajeput oil of medicine is obtained from the leaves and twigs of this and related species by steam distillation. Propagated from seeds.

RANGE.—Native from Burma through Malayan Peninsula to Molucca Islands and also in Australia. Planted and naturalized in tropical regions. Scattered in West Indies. Escaped from cultivation and naturalized in Everglades and swamps of southern Florida. Planted also in southern California and southern Texas.

OTHER COMMON NAMES.—cayeput, aceite de cayeput, bálsamo de cayeput (Puerto Rico); cajeput-tree (English); bottlebrush, punk-tree, paperbark-tree (United States).

BOTANICAL SYNONYM.—*Melaleuca leucadendron* of authors, not L.

583. Cayeputi, cajeput-tree *Melaleuca quinquenervia* (Cav.) S. T. Blake*

Natural size.

584. Hoja menuda ***Psidium sintenisii*** **(Kiaersk.) Alain**

This species of hoja menuda, known only from eastern and western mountains of Puerto Rico, is characterized by: (1) opposite elliptic leaves 1¼–2½ inches long and ⅝–2 inches wide, slightly thickened, with many minute gland dots; (2) slender twigs much branched and spreading in horizontal plane; (3) flowers from top-shaped bud nearly ⅜ inch long, single on slender stalks at leaf bases; and (4) pear-shaped yellowish fruit about ¾ inch long, with calyx ring at apex.

An evergreen small tree to 30 feet high and 6 inches in trunk diameter. The trunk is slightly angled and grooved. Bark gray, slightly peeling, scaly and shaggy. The inner bark is pink brown, gritty and slightly astringent. Twigs slender, hairless, with gland dots, light green when young, becoming light gray.

Leaves opposite, hairless, with petioles ⅛–¼ inch long. Blades are short-pointed or blunt at apex, short-pointed at base, and sometimes turned under at edges, the upper surface green to dark green and slightly shiny with midrib sunken but without visible side veins, and the lower surface yellow green and slightly shiny.

The fragrant flowers have slender stalks ⅜–1¼ inches long. The top-shaped hairless bud with gland dots is capped by the calyx, which splits and separates irregularly; the base (hypanthium) ⅛ inch long encloses the inferior ovary and bears the other parts; corolla of 5 concave whitish petals 3/16 inch long; many spreading stamens; and pistil with inferior 5-celled ovary containing many ovules, and slender style. The fruits change from light green to yellowish, have a hard thick wall, and contain several small seeds. Collected with flower buds in August, also with fruits from spring to autumn.

Wood whitish, hard.

Rare in upper Luquillo and upper Cordillera forests at 2,500–3,000 feet altitude in eastern and western mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo, Maricao.

RANGE.—Known only from mountains of Puerto Rico.

This species was first collected by P. Sintenis in Luquillo Mountains in 1885.

BOTANICAL SYNONYMS.—*Calyptropsidium sintenisii* Kiaersk, *Mitropsidium sintenisii* (Kiaersk.) Burret.

584. Hoja menuda *Psidium sintenisii* (Kiaersk.) Alain

Twig with flower buds (left), twig with old flowers (right), natural size.

585. Hoja menuda *Myrcia fallax* **(A. Rich.) DC.**

This species of hoja menuda is uncommon in high mountains of eastern and central Puerto Rico. Its distinguishing characters are: (1) opposite elliptic leaves, long- or short-pointed at apex and short-pointed at base, slightly thickened, with minute gland dots, the side veins in a network but not numerous; (2) white flowers ¼ inch across the 5 spreading petals and many stamens, many in terminal and lateral clusters; and (3) cylindric pinkish fruits about ½ inch long, with 5 calyx lobes at apex.

An evergreen small tree to 30 feet high and 6 inches in trunk diameter. The bark is gray, smoothish, becoming slightly fissured. Inner bark is light brown except for a dark red outer layer and is astringent. The slender twigs are light green and slightly hairy when young, becoming brown and fissured, ending in narrow bud of minute paired leaves.

The opposite leaves have brownish petioles ⅛ inch long, slightly hairy when young. Blades are 1–2½ inches long and ⅝–1¼ inches wide, hairless, often slightly turned under on edges, the upper surface shiny green with sunken midrib, and the lower surface slightly shiny light green.

Flower clusters (panicles) lateral and terminal, 2–3 inches long, with slender or sometimes stout branches and many small nearly stalkless fragrant white flowers. The greenish hairy base (hypanthium) 1/16 inch long encloses the inferior ovary and bears other parts; calyx of 5 spreading rounded yellowish lobes; 5 rounded white petals 1/16 inch long; many spreading white stamens; and pistil with inferior 2-celled ovary and curved hairy style. The fruit is about twice as long as wide and contains 1 shiny brown seed ⅜ inch long. With flowers and fruits in spring and summer.

The wood is light brown and hard.

Uncommon in upper Luquillo and Cordillera forests and dwarf forest at 2,000–3,500 feet altitude in high mountains of eastern and central Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo, Toro Negro.

RANGE.—Puerto Rico. Also Lesser Antilles from Montserrat to Trinidad and Tobago and from Panama and Colombia to Guianas, Brazil, Bolivia, and Peru.

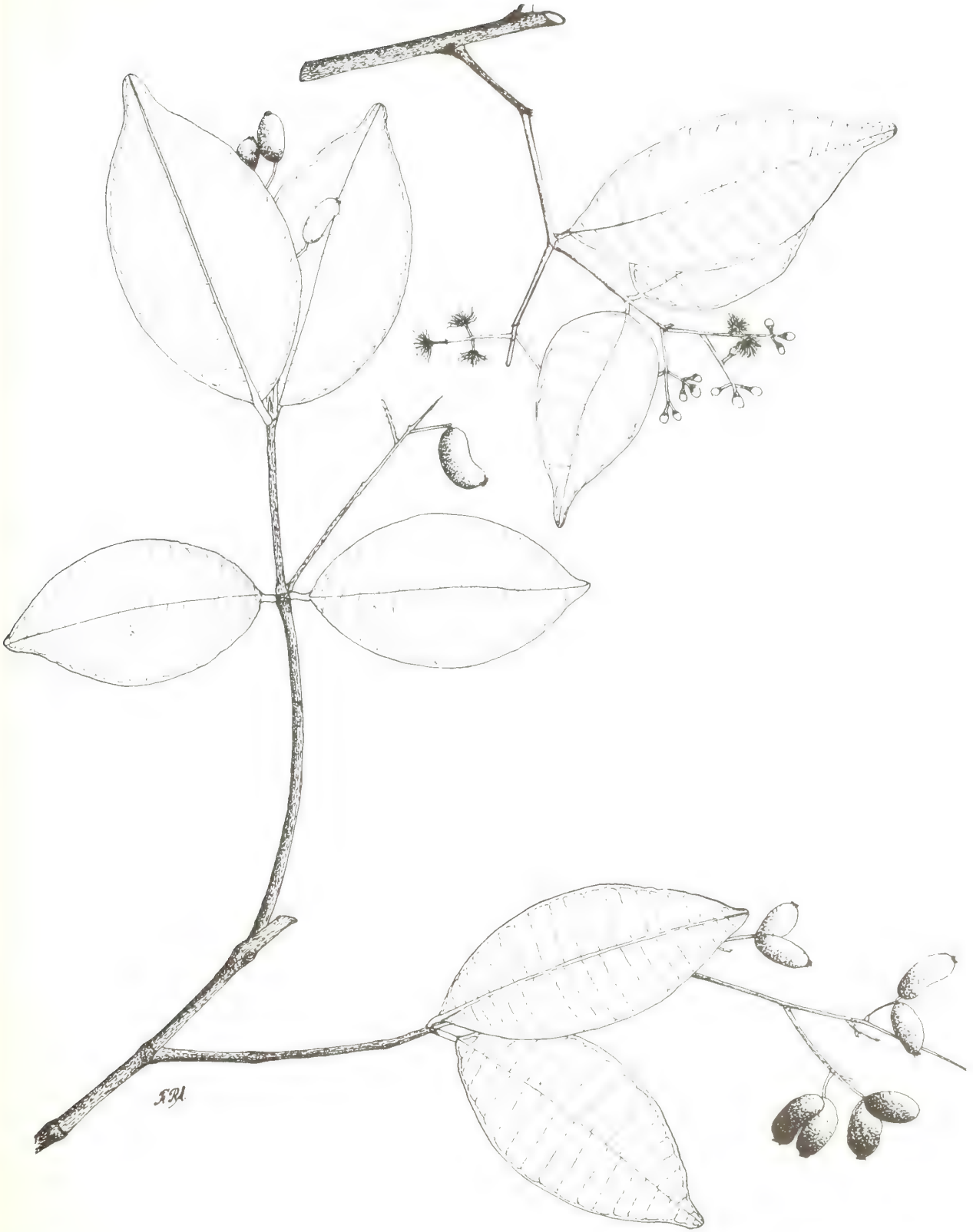
This species differs from the common species of hoja menuda in lower mountain areas (No. 193, *Myrcia splendens* (Sw.) DC.), which has numerous prominent straight side veins and shorter elliptic rounded berries ¼–5/16 inch long.

OTHER COMMON NAMES.—curame (Venezuela); rupiña (Peru); bois grille (St. Lucia); petit goyavier montagne (Guadeloupe); murta (Brazil).

BOTANICAL SYNONYM.—*Myrcia berberis* DC.

586. *Myrcia* **(?)** *paganii* **Krug & Urban.**

Named from a sterile specimen collected near Guajataca by P. Sintenis nearly a century ago and placed doubtfully in this genus. Rediscovered near the same area in 1959 by Woodbury but also without flowers and fruits. An evergreen tree 30 feet high and 5 inches in trunk diameter, recorded originally to 65 feet, having: (1) mottled tan-gray bark (like guava); the inner layer orange brown; (2) young twigs soft hairy and flattened; and (3) the opposite leaves elliptic to elliptic-oblong, 4–6¼ inches long, 1½–3½ inches wide, rounded or blunt at apex, short-pointed at base, net-veined on lower surface, and petioles 3/16 inch long. Rare in moist limestone forest at 600–800 feet altitude in northwestern Puerto Rico. PUBLIC FOREST.—Guajataca. RANGE.—Known only from Puerto Rico. The name commemorates Juan Bianchi Pagán, Puerto Rican who collected plant specimens for Leopold Krug in 1880–1884.



585. Hoja menuda *Myrcia bracteolaris* (Poir.) DC.

Fruiting twig (left), flowering twig (upper right), natural size.

587. Guayabacón *Myrcianthes fragrans* (Sw.) McVaugh

This aromatic shrub or tree is rare in Puerto Rico but more common in the other islands. It is distinguished by: (1) mottled tan-gray bark, the inner layer orange brown, peeling or flaking off in plates (like guava); (2) leaves opposite small, elliptic to obovate, thick and leathery; (3) fragrant white flowers about 3/8 inch across the 4 spreading petals and many stamens, several in long-stalked clusters at leaf bases; and (4) rounded purple black berries 3/8 inch in diameter, with 1–2 bean-shaped seeds.

An evergreen tree to 55 feet high and 14 inches in trunk diameter, the base becoming buttressed. Inner bark reddish brown. Twigs slender, brown, finely hairy.

The opposite leaves have finely hairy petioles 1/8–1/4 inch long. Blades are 1–2 inches long and 5/8–1 1/8 inch wide, blunt or rounded or sometimes notched at apex, short-pointed at base, often turned under at edges, becoming nearly hairless, with minute gland dots, side veins inconspicuous. The upper surface is shiny green, and the lower surface dull light green.

Flower clusters (cymes) about 2 inches long, bearing several flowers on short branches at the end of a long stalk of 1–1 1/2 inches. The flower is composed of light green hairy base (hypanthium) 1/8 inch long bearing 4 light green calyx lobes 1/8 inch long and other parts; 4 white concave petals 3/16 inch long; many spreading white stamens 5/16 inch long; and pistil with inferior 2-celled ovary containing many ovules and long threadlike curved white style. The berry has calyx lobes persistent at apex. With flowers and fruits in spring and summer.

Rare in moist and dry coastal forests and dry limestone forest from sea level to 700 feet altitude in southwestern Puerto Rico and near Dorado. Also widely distributed and uncommon on Mona, Culebra, Vieques, St. Croix, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Guánica, Susúa; Virgin Islands, Sage Mountain.

RANGE.—Southern Florida, Bahamas, Greater Antilles, St. Martin, Saba, St. Kitts, Antigua, Guadeloupe, and Martinique. Also from eastern and southern Mexico through Central America to Colombia and Venezuela.

OTHER COMMON NAMES.—guayabacón (Puerto Rico); guayabillo (Spanish); arrayán (Dominican Republic); pimienta (Cuba); pimientilla (Mexico); guayabito (Venezuela); twinberry eugenia, nakedwood, naked stopper (United States); pale stopper, nakedwood (Bahamas); bois d'Inde (Haiti); mérisier (Guadeloupe); goyavier bois (Martinique).

BOTANICAL SYNONYMS.—*Anamomis fragrans* (Sw.) Griseb., *Eugenia fragrans* (Sw.) Willd., *E. punctata* Vahl, *E. dicrana* Berg.

The plants in coastal thickets of Fajardo in northeastern Puerto Rico have been named *Myrcianthes fajardensis* (Krug & Urban) Alain.

587. Guayabacón *Myrcianthes fragrans* (Sw.) McVaugh

Flowering twig (upper left), fruiting twig (lower right), natural size.

588. Mirto, guavaberry ***Myrciaria floribunda*** **(West ex Willd.) Berg**

Guavaberry or mirto, found at low altitudes through the islands, is identified by: (1) opposite lanceolate leaves ending in a very long narrow point; (2) almost stalkless white flowers about $\frac{3}{16}$ inch across, clustered at base of leaves; and (3) the guavaberries, round and about $\frac{3}{8}$ inch in diameter, red or yellow, aromatic.

An evergreen tree to 55 feet high and 1 foot in trunk diameter, hairless throughout. Bark tan to light gray mottled, smooth, the inner layer orange brown, peeling or flaking off in plates (like guava). Twigs gray, very slender.

The opposite hairless leaves have slender petioles $\frac{1}{8}$ inch long. Blades are $1\frac{1}{2}$–$2\frac{1}{2}$ inches long and $\frac{3}{8}$–$\frac{3}{4}$ inch wide, short-pointed at base, not toothed on edges, thin with minute gland dots, with many inconspicuous side veins, the upper surface dull green, and lower surface dull light green.

The flowers have funnel-shaped base (hypanthium) $\frac{1}{16}$ inch long and 4 calyx lobes $\frac{1}{16}$ inch long, rounded and fringed, splitting off together evenly at base; 4 white petals $\frac{1}{16}$ inch long, rounded and fringed; many stamens; and pistil with inferior 2-celled ovary and slender style. There are 1 or 2 rounded seeds. Fruits mature from December to April.

The aromatic fruits make excellent strongly flavored jam, also, in the Virgin Islands, guavaberry rum. Though not cultivated, trees are left in pastures for the fruits.

Rare in dry and moist coastal forests from sea level to 700 feet altitude in Puerto Rico. Also widespread and perhaps common locally in dry forest to 1,000 feet altitude in Vieques, Culebra, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FOREST AND PARKS.—Guánica; Virgin Islands, Gorda Peak.

RANGE.—Puerto Rico and Virgin Islands, Cuba, and Hispaniola. Lesser Antilles in St. Martin, St. Eustatius, St. Kitts, Guadeloupe, and Martinique. Also southern Mexico, Central America, and from Colombia, Venezuela, Trinidad, and Guianas to eastern Brazil and Peru.

OTHER COMMON NAMES.—murta (Puerto Rico); guavaberry (Virgin Islands); mijo (Dominican Republic); mije (Cuba); guayabillo (Guatemala); jaboticaba (Honduras); escobo, cabo de chivo (El Salvador); arrayán (Colombia); guayabillo blanco, guayabito (Venezuela); small-leaved wild guava, guavaberry (Trinidad); bois mulâtre (Haiti); cococarette (Martinique); ti feuilles, mérisier (Guadeloupe); guaveberry (St. Martin, St. Eustatius); escobillo (Nicaragua).

BOTANICAL SYNONYM.—*Eugenia floribunda* West.

This widespread species was named in 1800 from a specimen collected in St. Croix.

588. Mirto, guavaberry *Myrciaria floribunda* (West ex Willd.) Berg

Flowering twig (left), fruiting twig (right), natural size.

589. Beruquillo ***Marlierea sintenisii* Kiaersk.**

This rare shrub or small tree known only from the dwarf forest of Luquillo Mountains is identified by: (1) short rusty-brown hairs on young twigs, branches of flower clusters, and flowers; (2) opposite nearly round or broadly elliptic leaves notched at stalkless base, thick and stiff, and slightly rusty hairy beneath; (3) small yellowish flowers nearly ¼ inch broad with 4 petals and many stamens, several stalkless on branches of long lateral stalk; and (4) berries ⅜ inch in diameter, slightly flattened, with ring from calyx at apex.

An evergreen shrub 10–13 feet high or small tree to 30 feet high and 6 inches in trunk diameter. Twigs covered with short rusty-brown hairs when young, becoming gray and finely fissured.

The opposite stalkless leaves are 1½–3 inches long and 1⅛–2 inches wide, rounded at apex, notched at base, not toothed on edges. The upper surface is hairless, has midvein in a broad groove with sides curved up and convex; the lower surface has raised midvein and slightly concave sides with raised veins. Young leaves are shiny coppery red.

Flower clusters (panicles) at sides of twigs are less than 2 inches long including the stalk of 1 inch. The flower from a rounded hairy bud ⅛ inch long is composed of 4-lobed hairy calyx, 4 petals 1/16 inch long, many spreading stamens ⅛ inch long, and pistil with hairy inferior ovary and long slender style. The fruits contain 2 elliptic shiny brown seeds ¼ inch long. Flowering and fruiting from spring to autumn.

Rare in dwarf forest at 2,500 feet altitude in Luquillo Mountains.

PUBLIC FOREST.—Luquillo.

BOTANICAL SYNONYM.—*Plinia* (?) *sintenisii* (Kiaersk.) Britton.

RANGE.—Known only from Puerto Rico.

First collected by P. Sintenis and rediscovered in 1940 by Leslie R. Holdridge.

589. Beruquillo *Marlierea sintenisii* Kiaersk.

Flowering twig (left), fruiting twig (right), natural size.

590. Mountain guava ***Psidium amplexicaule* Pers.**

Mountain guava is a wild relative of No. 195, guayaba or common guava (*Psidium guajava* L.*), distinguished by: (1) opposite nearly round thick and leathery leaves 1½–2¾ inches in diameter, thick and leathery and almost stalkless; (2) smaller flowers 1 or few at ends or sides of twigs, about ½ inch across; and (3) rounded fruit about ¾ inch in diameter, with calyx lobes at apex.

An evergreen tree to 40 feet high and 1 foot in trunk diameter, recorded by Britton and Wilson (*10*) as a shrub 6–13 feet high. Bark mottled tan-gray, the inner layer orange-brown, peeling or flaking off in plates (like guava). Twigs gray, slender, hairless.

The opposite leaves are rounded at apex, slightly notched at base, slightly turned under at edges, with side veins straight and widely spreading, paler beneath.

Flowers on slender stalks about ½ inch long, composed of calyx with irregular rounded lobes ⅛–3/16 inch long, thick and persistent on fruit; the corolla of 4 white petals; many threadlike white stamens; and pistil with inferior 2–4-celled ovary and long threadlike curved style. With flowers and fruits in spring and to fall.

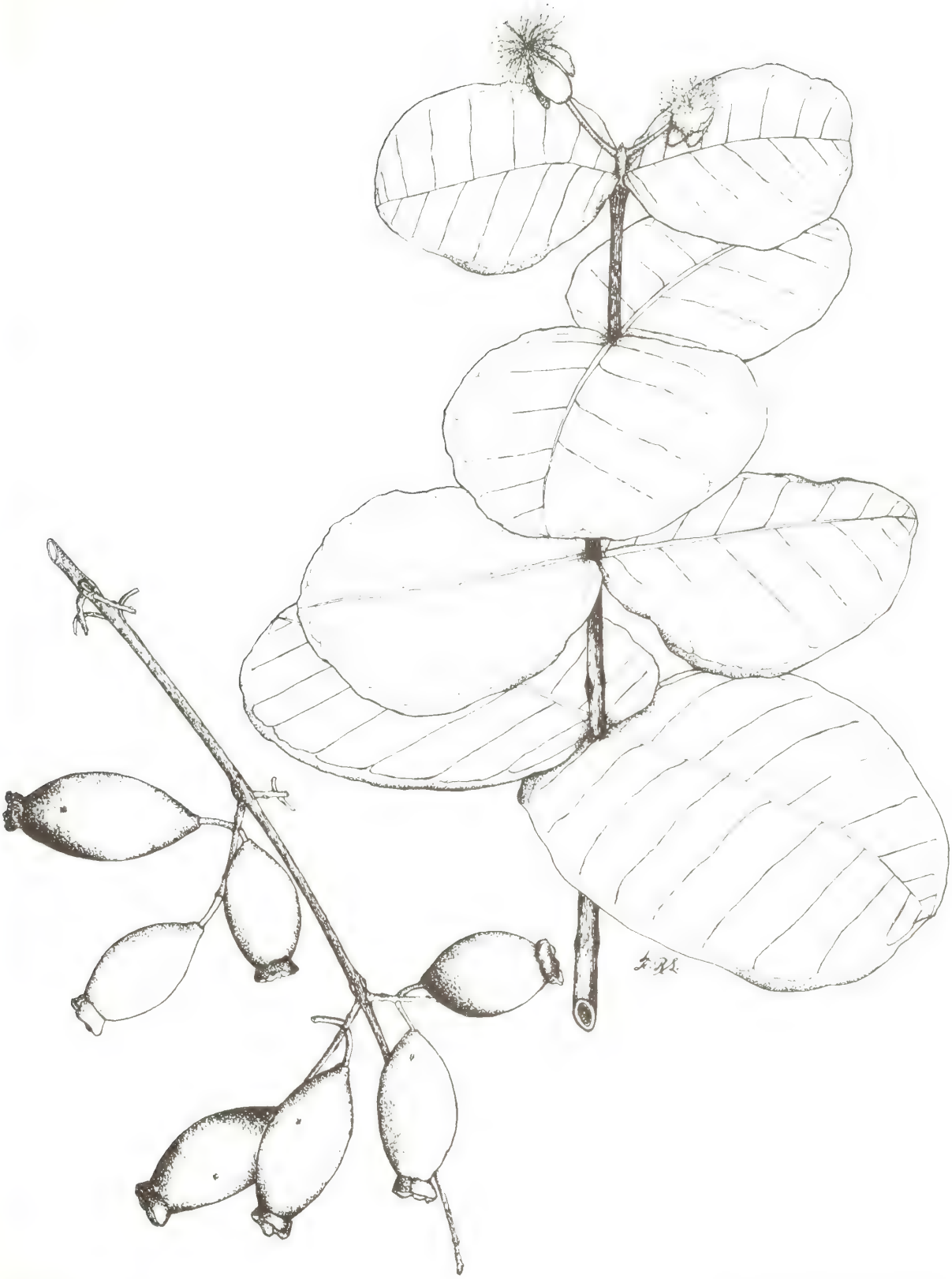
Rare in moist limestone forest at 100–600 feet altitude on north coast of Puerto Rico. Also St. Thomas, St. John, Tortola, and Virgin Gorda. Recorded as planted on St. Croix. However, not found in Culebra and Vieques.

PUBLIC FORESTS AND PARKS.—Guajataca, Río Abajo; Virgin Islands, Sage Mountain, Gorda Peak.

RANGE.—Puerto Rico and Virgin Islands. Recorded also from Nevis and as planted on Guadeloupe.

OTHER COMMON NAME.—mountain guava (Virgin Islands).

This species of the Virgin Islands was not known from Puerto Rico until collected at Río Abajo in 1938 by Leslie R. Holdridge of the U. S. Forest Service.



590. Mountain guava *Psidium amplexicaule* Pers.

Flowering twig (above), immature fruits (lower left), natural size.

591. ***Siphoneugena densiflora* Berg**

This shrub or tree of mountains of central and western Puerto Rico is recognized by: (1) opposite small elliptic leaves ¾–1½ inches long and ⅜–¾ inch wide, slightly long-pointed at both ends and almost diamond-shaped, slightly thickened and leathery and turned under at edges, with minute gland dots, the side veins inconspicuous; (2) slender brown twigs covered with short hairs when young; (3) few small white flowers nearly ¼ inch broad with 4 petals and many stamens, almost stalkless at leaf bases; and (4) round shiny black berries more than ⅜ inch in diameter, the apex with tube and ring from base of calyx.

An evergreen shrub or small tree 25 feet high and 4 inches in trunk diameter, sometimes to 40 feet and 10 inches. The bark is light gray brown, smoothish to slightly fissured and flaky, the inner bark brown, fibrous, and astringent.

The opposite leaves have short finely hairy petioles less than ⅛ inch long. Blades are blunt at the long-pointed apex, hairless, shiny green to dark green on upper surface, and slightly shiny light green beneath.

The few flowers are scattered along twigs at leaf bases and back of leaves on stalks of less than ⅛ inch. Buds are rounded, more than ⅛ inch long, the gland-dotted calyx with tube 1/16 inch long splitting irregularly into 4 hairy lobes. There are 4 white finely hairy petals less than 1/16 inch long, many spreading stamens ⅛ inch long, and pistil with inferior ovary less than 1/16 inch long and long slender style. The fruits are broader than long and change color from green to reddish to black. The soft juicy pink flesh is almost tasteless. Seeds 1 or 2, elliptic, ¼–⅜ inch long, brown. With flowers in spring and fruits in spring and summer.

The wood is light brown and hard.

Common in upper Cordillera forest, also dwarf forest at 2,000–4,000 feet altitude in central and western mountain regions of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Maricao, Toro Negro.

RANGE.—Puerto Rico, Guadeloupe, and Martinique. Also Venezuela.

OTHER COMMON NAMES.—hoja menuda (Puerto Rico); cerisier montagne (Guadeloupe).

BOTANICAL SYNONYM.—*Plinia dussii* (Krug & Urban) Urban.

591. *Siphoneugena densiflora* Berg

Fruiting twig (upper left), twig with flowers and fruits (lower right), natural size.

MELASTOME FAMILY (MELASTOMATACEAE)

Herbs, shrubs, and trees, mostly small, known by: (1) leaves opposite, simple, generally with 3–9 main veins curved from base to apex and many fine straight parallel side veins (1 main vein in *Mouriri*), without stipules; (2) flowers usually many in panicles or cymes, small to large, often showy, bisexual, regular, with generally 4–6 sepals meeting by edges in bud, 4–6 petals commonly white or pink and falling early, mostly 8–12 stamens folded in bud and often slightly irregular, with anthers opening by pores, and pistil with usually inferior 4–14-celled ovary containing very many ovules and with long style; and (3) fruit a capsule or berry (often edible), generally with very many minute seeds. Also vol. 1, p. 418.

Key to species

A. Leaves with 1 midvein; berry with 1–4 large seeds—*Mouriri.*
  B. Leaves ovate, long-pointed, 2–3½ inches long—615. *Mouriri domingensis.*
  BB. Leaves obovate to elliptic, rounded or blunt-pointed, ⅜–1½ inches long—616. *Mouriri helleri.*
AA. Leaves with 3–9 main veins curved from base to apex (melastome venation); berry (capsule in No. 622) with many minute seeds.
  C. Fruit a capsule; leaves bristly hairy; flowers very large, purplish; introduced ornamental—622. *Tibouchina granulosa.**
  CC. Fruit a berry; leaves not bristly hairy (except Nos. 197, 592); flowers mostly small, white or pink; native species.
    D. Flower clusters lateral.
      E. Flower clusters on twigs mostly back of leaves.
        F. Leaves with 3 main veins; twigs and leaves hairless or nearly so.
          G. Twigs and petioles hairless, even when young; leaves mostly finely saw-toothed—598. *Mecranium amygdalinum.*
          GG. Twigs and petioles with scale hairs when young; leaves not toothed on edges—595. *Henriettea macfadyenii.*
        FF. Leaves with 5 main veins, not toothed on edges; twigs and petioles bristly hairy.
          H. Leaves rounded or blunt at base—596. *Henriettea membranifolia.*
          HH. Leaves short-pointed at base.
            I. Petioles ½–1 inch long—594. *Henriettea fascicularis.*
            II. Petioles 1–2 inches long—597. *Henriettea triflora.*
      EE. Flower clusters at base of leaves.
        J. Hairs long slender, bristly on twigs and leaves; leaf edges finely wavy—592. *Clidemia umbrosa.*
        JJ. Hairs short stout or conic, stiff, forming rough surfaces on twigs and leaves; leaf edges finely saw-toothed—617. *Ossaea krugiana.*
    DD. Flower clusters terminal.
      K. Leaves less than 4 inches long, with 3 main veins.
        L. Leaves elliptic, mostly rounded at apex, thick with edges turned under, lower surface with dotlike brown scales—196. Jusillo, *Calycogonium squamulosum* Cogn.
        LL. Leaves lance-shaped, pointed at apex, lower surface whitish, soft hairy.
          M. Leaves very narrow, ¼–½ inch wide, long-pointed at apex; flowers many, ¼ inch across the purplish or pinkish petals—618. *Tetrazygia angustifolia.*
          MM. Leaves narrow, ½–¾ inch wide, short-pointed at apex; flowers few, ¾ inch across the white petals—199. Verdiseco, *Tetrazygia elaeagnoides* (Sw.) DC.
      KK. Leaves more than 3 inches long, mostly with 5 or more main veins.
        N. Leaves broadly ovate, with 7 main veins from heart-shaped base, bristly hairy; petioles and twigs with red sticky (gland) hairs—197. Camasey peludo, *Heterotrichum cymosum* (Wendl.) Urban.
        NN. Leaves various, hairs not glandular or none.
          O. Calyx forming cap and falling off like lid as the white flower 1 inch wide opens; leaves elliptic or oblong, 5–10 inches long, 1½–3 inches wide; very rare species of Luquillo Mountains—593. *Conostegia hotteana.*
          OO. Calyx of several lobes overlapping in bud; leaves various.
            P. Branches of flower clusters flattened, ending in 3 flowers largely showy, white, 4-parted.
              Q. Leaves green on both surfaces—619. *Tetrazygia biflora.*
              QQ. Leaves whitish on lower surface from covering of minute scale hairs.
                R. Calyx of 4 short broad pointed lobes—621. *Tetrazygia urbanii.*
                RR. Calyx of 4 very narrow lobes—620. *Tetrazygia stahlii.*
            PP. Branches of flower clusters rounded, slender—*Miconia* (key to species below).

Key to species of *Miconia*

A. Leaves very large, elliptic, mostly 6–12 inches long, finely toothed on edges, beneath brownish and densely covered with star-shaped hairs, clasping or notched at base.
  B. Leaves stalkless and clasping at base—601. *Miconia impetiolaris.*
  BB. Leaves with long stout petioles, slightly notched at base—610. *Miconia serrulata.*
AA. Leaves smaller, mostly elliptic or ovate.
  C. Leaves notched or rounded at base, more or less thickened; species of high mountains.
    D. Leaves with veins much sunken in pattern of small rectangles and squares and much raised beneath.
      E. Young twigs, petioles, branches of flower clusters, and flowers covered with dark red soft erect hairs, many ending in gland—600. *Miconia foveolata.*
      EE. Young twigs, petioles, and veins of lower leaf surfaces covered with cinnamon-brown scale hairs—611. *Miconia sintenisii.*
    DD. Leaves with veins only slightly or not sunken.
      F. Lower leaf surfaces, also twigs, petioles, and branches of flower clusters, covered with rusty or brownish soft hairs—609. *Miconia rubiginosa.*
      FF. Lower leaf surfaces light green with hairs only on veins.
        G. Young twigs and petioles covered with minute cinnamon-brown hairs.—605. *Miconia pachyphylla.*
        GG. Young twigs, petioles, and branches of flower clusters covered with reddish brown scale (scurfy) hairs—607. *Miconia pycnoneura.*
  CC. Leaves short- or long-pointed at base.
    H. Leaves densely scale hairy (scurfy) beneath.
      I. Leaves with 5 main veins from base, surfaces gray green; flowers large and showy, ¾ inch across—603. *Miconia mirabilis.*
      II. Leaves with 3 main veins from base, surfaces brown; flowers small, ¼ inch long—606. *Miconia punctata.*
    HH. Leaves hairless or nearly so beneath.
      J. Leaves finely saw-toothed hairy on edges and with tuft of hairs at base above; flowers stalkless along upper side of branches; shrub or rarely tree—608. *Miconia racemosa.*
      JJ. Leaves without hairs on edges and at base; flowers in various angles; trees or sometimes shrubs.
        K. Leaves with 5 main veins including side veins joining midvein above base.
          L. Petioles with bristly red hairs; flowers pink, large, long-stalked—614. *Miconia thomasiana.*
          LL. Petioles hairless; flowers whitish, short-stalked—198. Camasey, *Miconia prasina* (Sw.) DC.
        KK. Leaves with 3 or 5 main veins all from base.
          M. Leaves with 3 main veins from base; flowers with 4 petals and 4 stamens—613. *Miconia tetrandra.*
          MM. Leaves with 5 main veins from base; flowers with 5 petals and 10 stamens.
            N. Young twigs hairless or nearly so—612. *Miconia subcorymbosa.*
            NN. Young twigs hairy.
              O. Leaves thick and stiff, oblong to obovate—599. *Miconia affinis.*
              OO. Leaves thin, elliptic, ovate, or lanceolate—602. *Miconia laevigata.*

592. ***Clidemia umbrosa*** **(Sw.) Cogn.**

This small tree of the Carite Mountains is identified by: (1) opposite large broadly elliptic leaves with border minutely wavy, with melastome venation, 5 main veins from base; (2) long bristly hairs on twigs, long petioles, leaf blades, flower stalks, and fruits; (3) lateral flower clusters 3–4 inches long and broad bearing several whitish flowers ¼ inch long on long stalks; and (4) purplish black round berries ⅜ inch in diameter.

An evergreen shrub or small tree to 30 feet high and 6 inches in trunk diameter. Twigs light green with dense bristly hairs and with rings at nodes. Buds formed of minute paired hairy leaves.

Leaves opposite, the long round petioles 2–5 inches long. Blades are broadly elliptic, thin, 5–8 inches long and 3–5 inches wide, ending in long narrow point at apex, rounded at base, with 5 main veins from base, also 1 vein along each border, with many parallel straight smaller veins, the upper surface dull green, slightly bristly hairy, with sunken veins, and the lower surface dull gray green, bristly hairy, with raised veins.

Flower clusters (panicles) at leaf bases, with very slender spreading pinkish hairy branches and several short-stalked flowers. The flower ¼ inch long and ⅛ inch wide has a hairy basal tube (hypanthium) ⅛ inch long, which encloses the inferior ovary and bears the 4-lobed calyx and other parts; corolla of 4 elliptic white petals ⅛ inch long; 8 white stamens 3/16 inch long; and pistil with inferior 4-celled ovary containing many ovules, slender style, and dot stigma. Fruits (berries) several on widely forking slender hairy stalks, hairy, slightly shiny, with ring of calyx at apex. The juicy whitish pulp, almost tasteless, encloses many tiny brown seeds. Flowering in spring and summer.

Rare in lower and upper Cordillera forests at 1,000–2,500 feet altitude in eastern mountains of Puerto Rico.

PUBLIC FOREST.—Carite.

RANGE.—Puerto Rico and Lesser Antilles from St. Kitts and Montserrat to Guadeloupe, Dominica, Martinique, and St. Lucia.

Collections by the authors, apparently the first with flowers and fruits from Puerto Rico, confirm an early doubtful record.

593. ***Conostegia hotteana*** **Urban & Ekman**

This very rare small to medium-sized tree of Luquillo Mountains and Carite Forest is described by: (1) light brown scaly hairs on 4-angled stout twigs and petioles ½–1½ inches long; (2) opposite elliptic thin leaves 5–10 inches long and 1½–4½ inches wide, abruptly long-pointed at apex, short-pointed at base, often wavy at margin, with melastome venation, with 5 main veins including 2 from above base, shiny green and nearly hairless with veins much sunken, and beneath light green with hairs on raised veins; and (3) flower clusters (panicles) terminal, large and branched, with short-stalked large flowers from buds ⅜ inch long, the calyx forming a cap that splits off from the cup-shaped base, the white petals almost ½ inch long spreading 1 inch across, the stamens slightly unequal, and the pistil with inferior 6-celled ovary. One tree 16 feet high and 6 inches in trunk diameter found by Dr. and Mrs. Richard J. Wagner within Luquillo Experimental Forest was reported in 1966 by Howard (*35*) as the second record for the species. Lower Luquillo Forest at 1,000–1,500 feet altitude, also a tree to 45 feet high and 8 inches in trunk diameter in Carite Forest at 2,000 feet altitude. Discovered in 1928 in Massif de la Hotte in southwestern Haiti.

RANGE.—Known only from Hispaniola (2 localities in southern Haiti) and mountains of eastern Puerto Rico.

592. *Clidemia umbrosa* (Sw.) Cogn.

Two-thirds natural size.

594. Camasey peludo ***Henriettea fascicularis*** **(Sw.) Gómez**

Camasey peludo is identified by: (1) opposite elliptic leaves with melastome venation, 5 main veins, 1 pair arising 1/8–1/4 inch above base and 1 vein along each border; (2) bristly hairs on young twigs, petioles, and leaf blades, especially veins; (3) small flowers 1/4 inch long with 4–5 white petals, scattered in short clusters at nodes for several inches back of leaves; and (4) black elliptic or rounded berries 3/8 inch long.

An evergreen small tree 20 feet high and 4 inches in trunk diameter, sometimes to 45 feet and 8 inches in diameter, or shrubby, with distinctive candelabra branching. The bark is gray, smoothish with fine fissures, the inner bark light brown, gritty and almost tasteless. Twigs are slightly 4-angled, green, becoming gray or brown, densely hairy. Buds are composed of young hairy leaves.

Leaves opposite, with densely hairy petioles 1/2–1 inch long. Blades are elliptic, thin, 3–5 inches long and 1 1/2–2 1/2 inches wide, short-pointed at both ends, not toothed on edges, with 5 main veins and parallel straight smaller veins, rough hairy on both surfaces, the upper surface slightly shiny green, and the lower surface dull gray green.

Flowers are borne several at a node back of leaves on slender stalks less than 1/4 inch long. The light green bell-shaped base (hypanthium) 1/8 inch long encloses the inferior ovary and bears the 4–5-toothed calyx and other parts; 4–5 pointed white petals; 8 or 10 stamens; and pistil with inferior ovary and slender style. The fruits (berries) have ring of calyx at apex, change color from green to red to black, and contain many brown seeds 1/16 inch long. The dark purple juicy pulp is slightly sweet. Flowering and fruiting probably nearly through the year.

The wood is light yellowish brown, hard, and moderately heavy.

Uncommon and scattered in foothills and mountains including lower Luquillo and upper Cordillera forests at altitudes of 800–2,500 feet.

PUBLIC FORESTS.—Carite, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico. Also Central America from British Honduras and Guatemala to Panama.

OTHER COMMON NAMES.—camasey bobo, camasey de paloma, camasey simple, camasey (Puerto Rico); cordobán (Cuba); petigrene (Haiti); capirote blanco (Nicaragua).

BOTANICAL SYNONYM.—*Henriettella fascicularis* (Sw.) C. Wright.

594. Camasey peludo *Henriettea fascicularis* (Sw.) Gómez

Two-thirds natural size.

595. Camasey ***Henriettea macfadyenii*** **(Triana) Alain**

This species of camasey is characterized by: (1) young twigs green, sharply 4-angled; (2) opposite narrowly elliptic leaves with melastome venation, 3 main veins, 1 pair arising from midvein ¼–½ inch above base, becoming hairless; (3) small whitish flowers less than ¼ inch long, scattered in short clusters at nodes for several inches back of leaves; and (4) round berries 3/16 inch in diameter.

An evergreen tree 25–40 feet high and 5–10 inches in trunk diameter, recorded to 60 feet. Young twigs with scattered scale hairs, 4-angled, becoming light gray.

The leaves are opposite, becoming nearly hairless, with slender petioles of ⅜–1 inch. Blades are 3–6 inches long, 1–2 inches wide, thin, short- to long-pointed at both ends, slightly turned under at edges, with 3 main veins, also 1 inconspicuous fine vein along each border and parallel straight smaller veins, the upper surface shiny green, and the lower surface dull light green.

Many flowers are borne on slender stalks less than ⅜ inch long, in clusters of few at a node along twig back of leaves. The half-round base (hypanthium) less than ⅛ inch long bears the short calyx with border wavy and not toothed; 4–5 pointed white petals less than ⅛ inch long; 8 or 10 stamens; and pistil with inferior ovary and slender style. The fruits (berries), reported to be white, have calyx ring at apex, and contain many minute brown seeds. Recorded with flowers in June and with fruits in July and September.

Rare in mountain forests, including lower Luquillo and lower Cordillera, at 2,000 feet altitude.

PUBLIC FORESTS.—Luquillo, Toro Negro.

RANGE.—Jamaica and Puerto Rico.

BOTANICAL SYNONYM.—*Henriettella macfadyenii* Triana.

This species was discovered in Jamaica by James Macfadyen (1798–1850), Scotch and Jamaican botanist and author of a flora of Jamaica. Collected afterwards in Puerto Rico but apparently not again in the first island.

595. Camasey *Henriettea macfadyenii* (Triana) Alain

Twig with immature fruits, natural size.

596. Camasey ***Henriettea membranifolia*** **(Cogn.) Alain**

This rare shrub or small tree is identified by: (1) opposite ovate or elliptic leaves with melastome venation, 5 main veins, 1 pair arising from midvein above base, rough hairy on both surfaces and along edges; (2) bristly hairy twigs and petioles; and (3) small white flowers about 3/16 inch long, almost stalkless in clusters at nodes back of leaves.

An evergreen shrub 6–10 feet high or a small tree to 30 feet tall and 6 inches in trunk diameter. Twigs round, bristly hairy.

Leaves opposite, rough hairy, with long petioles ½–1¼ inches long. Blades 4–8 inches long, and 2½–4 inches wide, thin, short-pointed at apex, rounded or blunt at base, with 5 main veins, 1 pair arising from midvein ¼–½ inch above base, and with straight parallel smaller veins, prominent on lower surface.

The flowers have a green hairless bell-shaped base (hypanthium) more than 1/16 inch long, which bears the other parts, including 4-toothed calyx and 4 pointed white petals less than ⅛ inch long. The fruit has not been described. Flowering in summer and fall.

Rare and local in moist limestone forest to 1,500 feet altitude, found only near Lares and Aguada in northwestern Puerto Rico. Collected by P. Sintenis in 1886 and rediscovered by one of the authors.

RANGE.—Known only from western Puerto Rico.

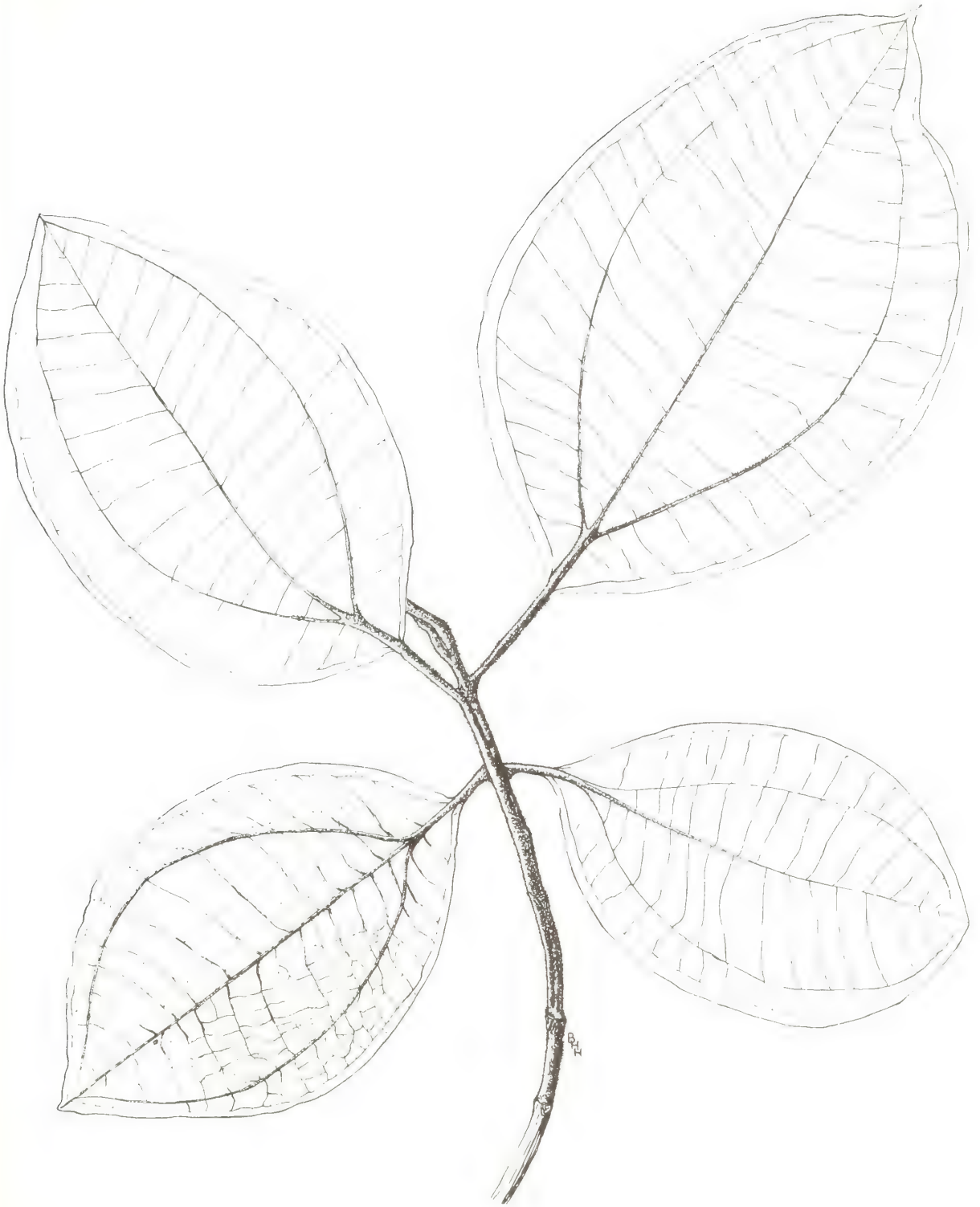
BOTANICAL SYNONYM.—*Henriettella membranifolia* Cogn.

597. ***Henriettea triflora*** **(Vahl) Alain**

This shrub or small tree of the Lesser Antilles has been found at Carite (Guavate) by Alain Liogier. It is identified by: (1) twigs, petioles, and leaf blades bristly hairy; (2) opposite elliptic thin leaves 5–7 inches long and 2–3 inches wide, long-pointed at apex, short-pointed at base, not toothed on edges, with melastome venation and 5 main veins, 1 pair arising from midvein ¼–½ inch above base, with many slightly curved parallel side veins, the lower surface paler, with bristly hairs only on veins and with minute projections, and with slender petioles 1–2 inches long; and (3) few stalkless flowers ½ inch long on twigs back of leaves with top-shaped bristly hairy base (hypanthium) ¼ inch long bearing minutely 4-toothed calyx, 4 white petals ⅜ inch long, 8 stamens, and pistil with inferior ovary and long slender style. Rare in mountain forest at Carite Forest in eastern Puerto Rico.

RANGE.—Puerto Rico and Lesser Antilles to St. Lucia.

BOTANICAL SYNONYM.—*Henriettella triflora* (Vahl) Triana.



596. Camasey *Henriettea membranifolia* (Cogn.) Alain

Leafy twig, natural size.

598. Camasey almendro *Mecranium amygdalinum* (Desr.) C. Wright

Camasey almendro is identified by: (1) the opposite elliptic, ovate, or lance-shaped leaves mostly finely saw-toothed, with melastome venation, 3 main veins, 1 pair arising from midvein ⅛–½ inch above base, also 1 pair of fine veins at margins; (2) flowers in short lateral clusters mostly back of leaves, about ¼ inch long and broad, with 4 whitish petals; and (3) round purplish black berries ¼ inch in diameter along twig back of leaves.

An evergreen shrub or small tree to 25 feet high and 5 inches in trunk diameter, with spreading crown. Twigs light green, hairless, becoming brown, slightly 4-angled, the nodes ringed, becoming slightly enlarged and marked with half-round leaf scars. Buds formed of minute narrow paired leaves.

Leaves opposite, hairless, petioles slender, ¼–1 inch long, light green, tinged with pink. Blades 2–5 inches long and ¾–2 inches wide, long-pointed at apex, long- or short-pointed at base, thin, the edges mostly finely saw-toothed but sometimes not, the upper surface yellow green, slightly shiny, with veins slightly sunken, and the lower surface dull light green with raised veins and minute gland dots. Shape and width of leaves vary somewhat.

Flower clusters (panicles) less than 1¼ inches long are borne at leaf bases but mostly at nodes along twigs back of leaves. Flowers several to many, composed of half-round greenish cuplike base (hypanthium) ⅛ inch broad, enclosing the inferior ovary, bearing 4-toothed calyx and other parts at apex; corolla of 4 whitish oblong spreading petals ⅛ inch long; 8 widely spreading white stamens ⅜ inch across; and pistil with inferior 4-celled ovary containing many ovules and with white slender style and dot stigma. The berries have calyx ring at apex, are very juicy but tasteless or slightly bitter, and contain many minute brown seeds. With flowers and fruits throughout the year.

The wood is light brown, hard, and lightweight.

Common and widely distributed through mountain forests of Puerto Rico, including upper and lower Cordillera and Luquillo Mountain forests, dwarf forest, and palm forest at middle and higher altitudes, 1,000–3,000 feet.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—camasey (Puerto Rico); palito de vara, pega pollo, sangre de pollo (Dominican Republic); cordobán (Cuba); bois pigeon (Haiti).

598. Camasey almendro *Mecranium amygdalinum* (Desr.) C. Wright

Natural size.

599. Camasey ***Miconia affinis* DC.**

This rare species of camasey is identified by: (1) opposite oblong to obovate leaves thickened and stiff, long-pointed at apex and blunt at base, finely toothed on edges, with melastome venation, with 5 main veins from base; (2) many short-stalked or stalkless flowers about 1/4 inch long, with 5 white petals 1/8 inch long; and (3) berries 3/16 inch in diameter, turning from green to blue.

An evergreen shrub or small tree to 25 feet high. Young twigs with minute star-shaped hairs, with raised rings at nodes.

The opposite leaves have petioles 3/8–3/4 inch long. Blades are 6–8 inches long and 2 1/4–3 inches wide, with 5 main veins from base and side veins prominent, becoming nearly hairless, dark green on upper surface, lower surface pale green with sparse minute star-shaped hairs.

Flower clusters (panicles) terminal, 3–5 inches long and broad, bearing many fragrant flowers. The bell-shaped scaly hairy greenish base (hypanthium) 1/16 inch long bears the slightly 5-toothed calyx and other parts; 5 white petals 1/8 inch long; 10 spreading white stamens 3/16 inch long; and pistil with inferior ovary, long slender style, and dot stigma. Collected with fruits in August.

Rare in Puerto Rico, recorded from Luquillo Mountains and from Rio Piedras west to Mayaguez. Not collected by the authors.

PUBLIC FOREST.—Luquillo.

RANGE.—Puerto Rico. Also southern Mexico to Colombia, Venezuela, Trinidad, French Guiana, Brazil, and Peru.

OTHER COMMON NAMES.—saquiyac (Venezuela); mullaca (Peru); sirin (British Honduras); tintureira (Brazil).

BOTANICAL SYNONYM.—*Miconia microcarpa* DC.

In number of native tree species, 17, *Miconia* is the second largest genus in Puerto Rico, as noted in the Statistical Summary. The generic name was dedicated to D. Micon, a Spanish physician. The common name camasey is applied to most species of this genus, also to some of related genera.

599. Camasey *Miconia affinis* DC.

Flowering twig (left), fruits (lower right), natural size.

600. Camasey ***Miconia foveolata* Cogn.**

This handsome shrub or small tree is known only from the dwarf forest of Luquillo Mountains. It is easily distinguished by: (1) the young twigs, petioles, branches of flower clusters, and flowers reddish and covered with dark red soft erect hairs, mostly ending in dotlike gland; (2) opposite ovate leaves notched or heart-shaped at base, thick and stiff, with pinkish gland hairs, the veins much sunken in depressions or pits on upper surface, forming a regular pattern of minute squares and rectangles swollen like blisters and on the lower surface corresponding depressions separated by very raised veins; (3) dark red hairy flowers ⅜ inch long, with 5 white petals tinged with pink; and (4) blue or purplish berries about ⅜ inch in diameter.

An evergreen shrub 10 feet high or a small tree 15 feet high and 3 inches in trunk diameter, recorded to 33 feet. Bark gray, smooth, often covered with mosses and liverworts, the inner bark whitish and slightly astringent. Twigs slightly 4-angled, stout, slightly ringed at nodes, when young pinkish and densely covered with red hairs, becoming light gray and hairless, with many raised dots, and with large rounded raised leaf scars. Buds of minute paired leaves, folded, covered with reddish hairs.

The long petioles of the opposite leaves are 1¼–2¾ inches long, stout, round, dark red and covered with dark red hairs. Blades are 3¼–9 inches long and 1¼–4¼ inches wide, long-pointed or sometimes short-pointed at apex, the hairy edges slightly turned under. There are 7 or 5 main veins from base and the many straight side veins of the melastome type are connected by many small veins at right angles. The upper surface is dark green and rough bristly hairy, and the lower surface light green, rough bristly hairy with very raised brown hairy veins.

Flower clusters (panicles) are terminal, erect, 4–5 inches high. Flowers many in groups of 3 or fewer on short stalks. The bell-shaped base (hypanthium) 3/16 inch long and broad is dark red with dark red gland hairs and bears the calyx with 5 rounded lobes and the other parts; 5 erect oblong white petals 3/16 inch long, tinged with pink; 10 white stamens; and pistil composed of inferior 3-celled ovary with many ovules, slender white style, and dot stigma. The fruits have many red hairs, also calyx at apex and are fleshy but tasteless. There are many minute brown seeds. Collected with flowers from April to August and with fruits from June to October.

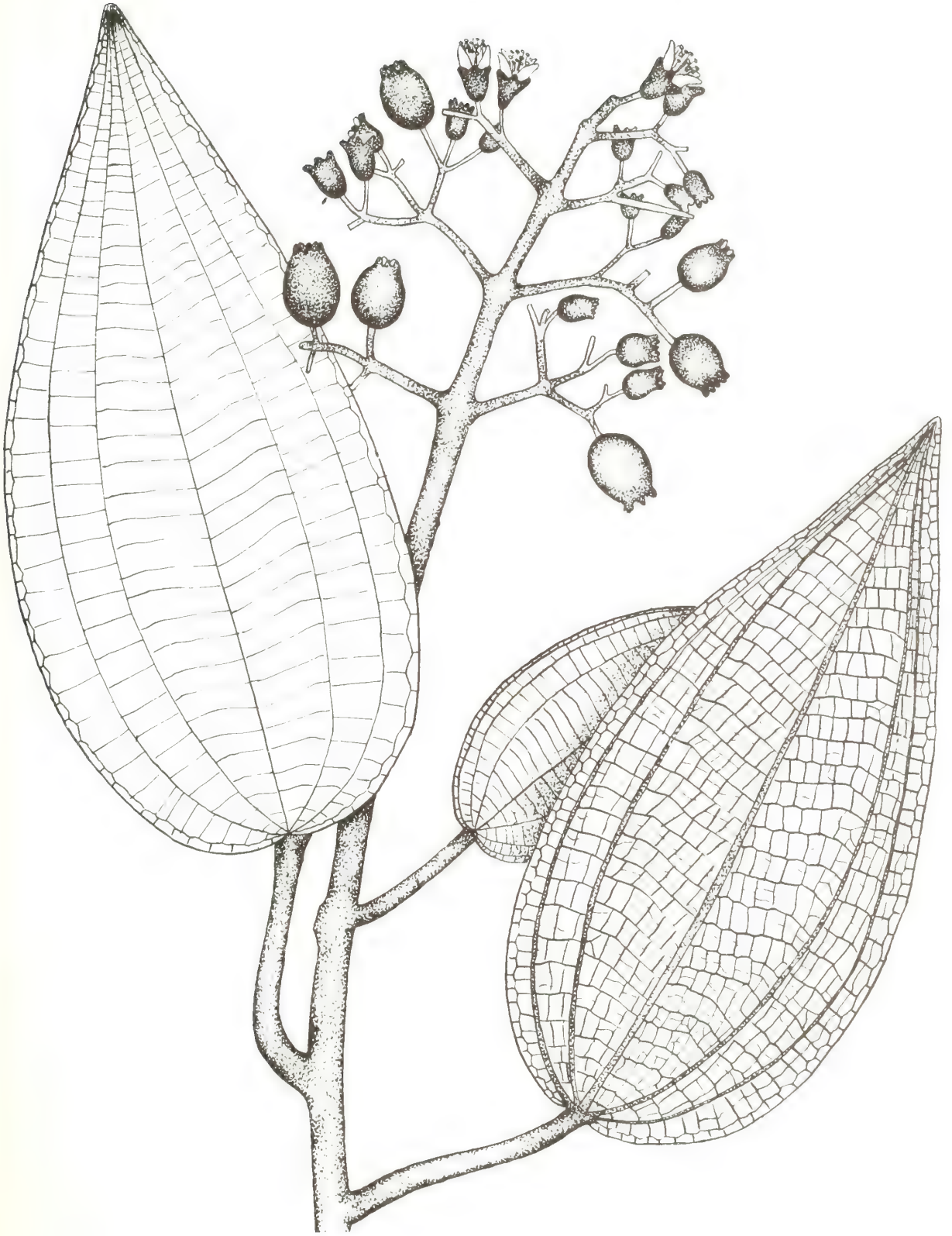
The wood is whitish and hard.

This attractive plant might be worthy of trials as an ornamental for its unusual leaves and reddish coloring.

Locally common in mountain and dwarf forests at 2,500–3,500 feet altitude in Luquillo Mountains.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquillo Mountains of eastern Puerto Rico.



600. Camasey

Miconia foveolata Cogn.

Natural size.

601. Camasey de costilla ***Miconia impetiolaris*** **(Sw.) D. Don**

Camasey de costilla, a small tree or shrub with striking foliage, is easily distinguished from its relatives by the large elliptic leaves somewhat clasping at base, stalkless or nearly so, beneath pale brownish green and densely covered with minute star-shaped hairs. Other characteristics for recognition are: (1) twigs and branches of flower clusters densely brown scurfy hairy; (2) the opposite leaves with minutely-toothed borders and with melastome venation, 5 main veins, 1 pair arising about ¼ inch above base; (3) large terminal branched flower clusters bearing many stalkless small flowers with 5 white petals and ⅜ inch long and broad across the spreading stamens; and (4) fruit a round berry about 3/16 inch in diameter, red, turning blue or blackish, with ring of calyx at apex.

A small evergreen tree to 20 feet high and 3 inches in trunk diameter or often shrubby, with stout twigs. The bark is brown and finely fissured.

Leaf blades are 8–16 inches long and 3–7 inches wide or larger, thick and leathery, long-pointed at apex, with many parallel lateral veins between the 5 main veins, above slightly shiny green and becoming hairless or nearly so.

The erect flower cluster (panicle) is 6–10 inches long, with simple spikelike branches. The flower has a bell-shaped tubular base (hypanthium) about ⅛ inch long, densely scurfy hairy, and bearing the 5-toothed calyx; 5 spreading white petals more than 1/16 inch long and notched at apex; 10 spreading stamens nearly ¼ inch long; and the pistil more than ¼ inch long consists of partly inferior ovary and style. The juicy fruit is slightly hairy and contains many pointed brown seeds less than 1/16 inch long. Flowering and fruiting from spring to fall.

The wood is light and hard.

Uncommon in Luquillo and Cordillera forests at 500–2,000 feet altitude in mountains of Puerto Rico. Also recorded long ago from St. Thomas and St. Croix but not found there in many years.

PUBLIC FOREST.—Luquillo.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, and Lesser Antilles in St. Eustatius, Montserrat, Guadeloupe, and Dominica. Also in continental tropical America from southern Mexico through Central America to Venezuela, Peru, Bolivia, and Brazil.

OTHER COMMON NAMES.—camasey colorado (Puerto Rico); auguey, jao-jao, jatico (Dominican Republic); cordobán (Cuba); hoja de pasmo (Costa Rica); dos caras, oreja de mula (Panama); punta de sarvia, punta de lanza (Colombia); maya, white maya (British Honduras); trois côtes, macrioi (Haiti).

601. Camasey de costilla *Miconia impetiolaris* (Sw.) D. Don

Fruiting twig (above), one-third natural size; leaf and flowers (below), two-thirds natural size.

602. Camasey de paloma ***Miconia laevigata*** **(L.) DC.**

Camasey de paloma, a shrub or small tree of wide distribution in Puerto Rico and the Virgin Islands, is characterized by: (1) the young twigs, petioles, branches of flower clusters, and flowers with rusty-brown scaly and star-shaped hairs; (2) opposite elliptic, ovate, or lanceolate thin leaves with melastome venation, 5 main veins from base; (3) many crowded flowers about ¼ inch long and broad, with 5 spreading white petals; and (4) round black or dark blue berries 3/16 inch in diameter, with 10 ridges when dry.

An evergreen shrub 6–10 feet high or small tree to 25 feet high and 6 inches in trunk diameter. Bark gray, smooth, the inner bark greenish or whitish and slightly sour or bitter. Twigs slender, slightly 4-angled, green and hairy when young becoming brown, ending in bud of rusty hairy paired young leaves.

Leaves opposite, with slender petioles ½–1¼ inches long. Blades 3½–8 inches long and 1–2¾ inches wide, long-pointed at apex, rounded or short-pointed at base, mostly finely-toothed on edges but sometimes not, with 5 main veins from base and many parallel side veins, the upper surface slightly shiny green and becoming hairless, and the lower surface dull light green and hairy on the raised veins.

Flower clusters (panicles) terminal, 2–6 inches long, with many slender branches. Flowers are stalkless or short-stalked, composed of bell-shaped base (hypanthium) ⅛ inch long, with spreading 5-toothed calyx; 5 spreading rounded white petals ⅛ inch long; 10 stamens; and pistil with inferior 3-celled ovary and slender style. The black fruits have ring of calyx at apex, 10 ridges when dry, and juicy blackish pulp. There are many minute brown seeds. Flowering and fruiting through the year.

The wood is whitish and hard.

Common and widespread in lower Luquillo, Cordillera, and moist limestone forest types from near sea level to 2,600 feet altitude. Throughout the mountains and moist limestone regions of Puerto Rico. Also in Vieques, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Cambalache, Guajataca, Luquillo, Maricao, Río Abajo, Susúa; Virgin Islands, Sage Mountain.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, through Lesser Antilles from St. Martin and Saba to Grenada, Barbados, and Trinidad and Tobago. Also from southern Mexico, Guatemala, and British Honduras to Panama and northern South America to Ecuador and Venezuela.

OTHER COMMON NAMES.—camasey (Puerto Rico); granadillo (Dominican Republic); cordobancillo de arroyo (Cuba); totopozole, teshuate, ojo de gato, capulineillo (Mexico); tinajito (Guatemala); cirín (El Salvador); cocinera (Honduras); crécré (Dominica); hogwood (Montserrat); crécré, crécré noir, bois cendre (Martinique).

602. Camasey de paloma *Miconia laevigata* (L.) DC.

Flowering twig (above), fruits (lower right), two-thirds natural size.

603. Camasey cuatrocanales *Miconia mirabilis* (Aubl.) L. O. Wms.

This handsome species of camasey is uncommon throughout the mountains of Puerto Rico. It is recognized by: (1) large showy clusters 4–6 inches long of many flowers ¾ inch across the 5 spreading white petals tinged with pink, 3–5 flowers from a bud covered by 2 large pinkish-white bracts like petals; (2) young twigs, petioles, lower leaf surfaces, and branches of flower clusters covered with minute brownish scurfy or star-shaped hairs; (3) opposite narrowly elliptic leaves with melastome venation, 5 main veins from base; and (4) round purplish black berries 5/16 inch in diameter, with large cuplike calyx at apex.

An evergreen small tree to 35 feet high and 6 inches in trunk diameter, the trunk commonly becoming slightly fluted with 4 vertical rounded columns or ridges and grooves. Bark gray, smooth, the inner bark light brown or pink and slightly bitter. Twigs brown, finely hairy, slightly 4-angled, ringed and slightly enlarged at nodes, ending in bud of minute paired narrow scaly hairy leaves.

Leaves opposite, with slender petioles ¾–2½ inches long, brown hairy. Blades 4–6½ inches long and 1¼–2½ inches wide, long-pointed at apex, rounded or short-pointed at base, slightly thickened, the edges not toothed or sometimes with minute teeth, with 5 main veins from base, slightly sunken, and many nearly straight side veins. The upper surface is shiny dark green and hairless, and the lower surface light gray green, covered with minute star-shaped hairs, with prominent veins, the 5 main veins pink brown and covered with scurfy hairs. Young leaves are yellow green to pink at base and green toward apex.

Flower clusters (panicles) terminal, narrow, with many showy white slightly fragrant flowers in groups of 3–5 on short stout stalks from a bud covered by 2 pinkish white bracts like petals which shed promptly. The flower about 5/8 inch long is composed of light green cylindric basal tube (hypanthium) 1/8 inch long, becoming hairless or nearly so, enclosing the ovary and bearing the other parts; calyx 1/16 inch long, slightly 5-lobed, nearly hairless or hairy; 5 oblong white petals 3/8 inch long; 10 yellow or orange stamens bent to 1 side; and pistil with superior greenish ovary 3-celled with many ovules, slender curved whitish style, and disklike stigma. The fruits have cuplike slightly 5-lobed calyx at apex. The juicy, purplish black pulp contains many brown seeds less than 1/16 inch long. Flowering and fruiting continuously.

The light brown hard wood is used elsewhere for fence posts.

This species may be worthy of cultivation as an ornamental for the large showy clusters of white flowers which are borne in profusion over the year.

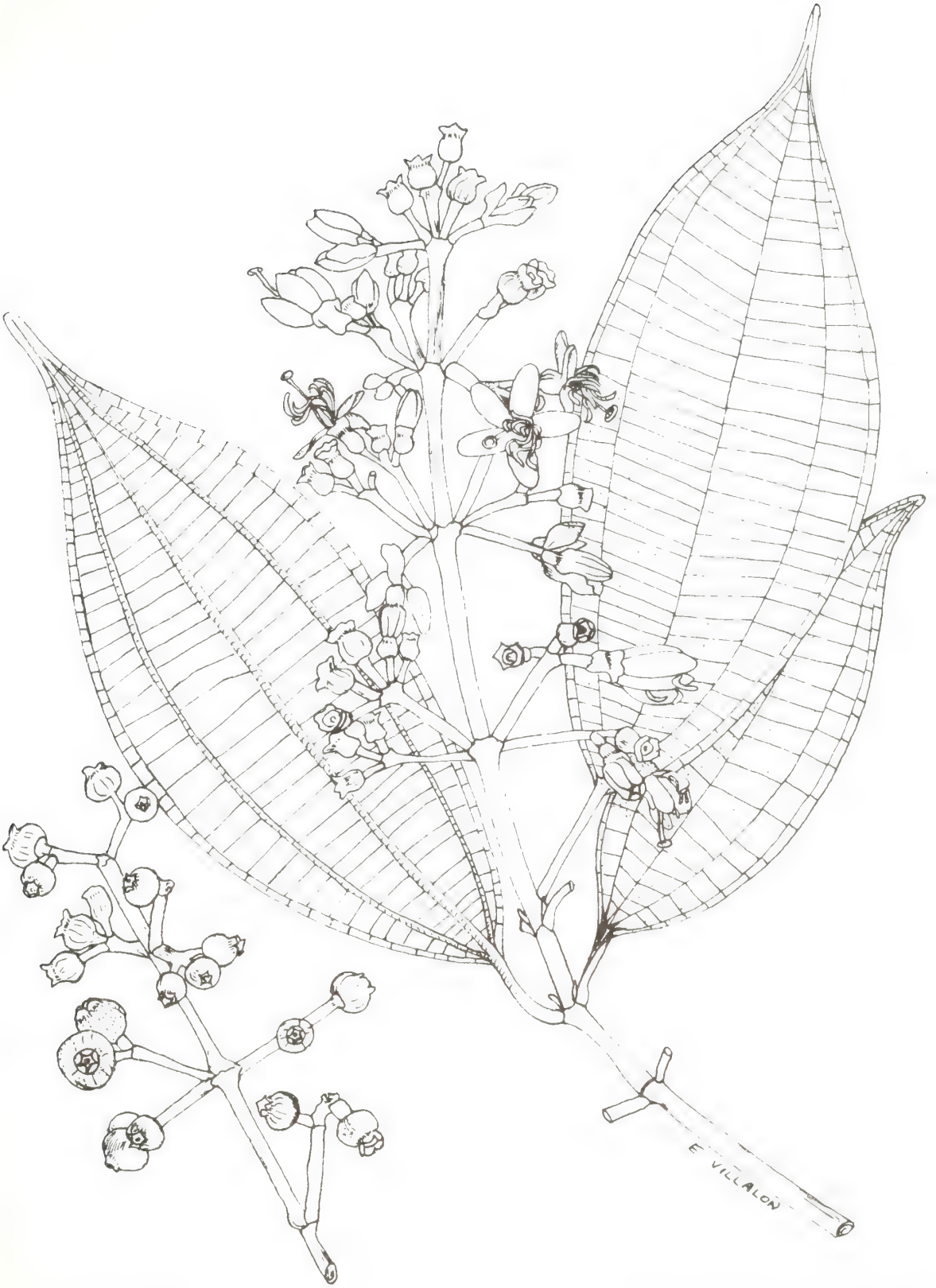
Uncommon but widespread in lower Luquillo and Cordillera forests at 500–3,000 feet altitude throughout the mountains of Puerto Rico. Collected at 1,500 feet on Tortola in 1887.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, Tortola, and Lesser Antilles from St. Kitts to Grenada and Trinidad and Tobago. Also Mexico, British Honduras, and Costa Rica but apparently rare. South America from Venezuela and Trinidad and Tobago to Guianas and Brazil.

OTHER COMMON NAMES.—camasey, camasey blanco, camasey de costilla (Puerto Rico); tresfilos (Dominican Republic); manzano (Venezuela); sirin manzana (British Honduras); waraia (Guyana); bois cotte (St. Lucia); bois côtelette (Guadeloupe); crécré (Martinique); bois cré-cré (Dominica); tinteiro (Brazil).

BOTANICAL SYNONYMS.—*Miconia guianensis* (Aubl.) Cogn., *M. fothergilla* (Desr.) Naud., *Tamonea guianensis* Aubl.



603. Camasey cuatrocanales *Miconia mirabilis* (Aubl.) L. O. Wms.

Flowering twig (above), fruits (lower left), natural size.

604. ***Miconia ottoschulzii* Urban & Ekman**

A medium-sized tree to 12–16 inches in trunk diameter or a shrub. Identified by: (1) opposite ovate or elliptic leaves 3–6 inches long and 1½–3 inches wide, long-pointed at apex, rounded to short-pointed at base, not toothed on edges, with melastome venation, 3 main veins, 1 pair from ⅛ inch above base, hairless or nearly so, with petioles ¼–⅝ inch long; (2) flowers about 3/16 inch long, with top-shaped base (hypanthium) 1/16 inch long bearing calyx slightly 3–4-lobed, 5 white petals, 10 stamens short-stalked in terminal clusters; and (3) rounded berries 3/16 inch in diameter, 5-celled, containing 3-angled seeds more than 1/16 inch in diameter. Identified from a sterile specimen of a shrub 6 feet high collected in forest at Isabón nearly a century ago and not found afterwards in Puerto Rico.

RANGE.—Hispaniola and Puerto Rico.

OTHER COMMON NAME.—petites graines (Haiti).

BOTANICAL SYNONYM.—*Graffenriedia ottoschulzii* (Urban & Ekman) Urban & Ekman. The specific name honors Otto Eugen Schulz (1874–1936), German botanist, who studied plants of the West Indies.

605. Camasey racimoso ***Miconia pachyphylla* Cogn.**

This shrub or small tree is known only from high mountains of Puerto Rico. Its distinguishing characters are: (1) opposite, ovate long-pointed leaves notched or heart-shaped at base, thick and leathery (as the scientific name indicates) with melastome venation, with 5 main veins from base including 1 pair of inconspicuous fine veins near the rolled under margins; (2) flowers ¼ inch long, with 4 purple or reddish petals more than ⅛ inch long, many in terminal clusters shorter than leaves; and (3) round berries about 5/16 inch in diameter, red to purplish black.

An evergreen shrub 6–10 feet high or small tree to 20 feet high and 5 inches in trunk diameter, recorded to 33 feet. The dark brown or gray smoothish bark is covered with mosses and liverworts. Inner bark is light brown, almost tasteless or slightly sour. Twigs are stout, brown, when young slightly flattened and covered with minute cinnamon-brown hairs, becoming round, often slightly ringed at nodes. Buds are composed of narrow folded young leaves densely covered with cinnamon-brown hairs.

The opposite leaves have stout petioles ½–1½ inches long, cinnamon-brown hairy. Blades are 3¼–5½ inches long and 1½–2¼ inches wide, with 5 main veins from base appearing as 3 (2 near margins scarcely noticeable), sunken, and numerous fine straight side veins. The upper surface is green to dark green, hairless, and slightly shiny, and the lower surface light green, with minute brown hairs on veins.

Flower clusters (panicles) terminal, 2–3 inches long and broad, with widely spreading slender branches and many flowers grouped on short stalks 1/16 inch long. The bell-shaped base (hypanthium) less than ⅛ inch long bears the 4-toothed calyx and other parts; 4 oblong purple petals more than ⅛ inch long; 8 stamens ⅛ inch long; and pistil with inferior ovary and slender curved style. Fruits (berries) have ring of calyx at apex, change color from light green to red to purplish black at maturity, and are slightly shiny, juicy, and slightly sweetish. There are many light brown seeds about 1/16 inch long. Flowering and fruiting irregularly through the year.

The wood is light brown and hard.

Uncommon in dwarf forest and upper mountain forests at 2,000–4,000 feet altitude in high mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from high mountains of Puerto Rico.

605. Camasey racimoso *Miconia pachyphylla* Cogn.

Flowers (lower left), fruiting twig (right), natural size.

606. Camasey ***Miconia punctata*** **(Desr.) D. Don**

A rare shrub or small tree found near Lares and Utuado, identified by: (1) twigs and lower leaf surfaces densely covered with brown scale hairs; (2) opposite oblong to oblanceolate slightly thickened leaves with melastome venation, with 3 main veins from base, not toothed on edges; (3) many flowers about 1/4 inch long; and (4) round berries 1/8 inch in diameter.

An evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter. Twigs stout, 4-angled, scaly hairy.

Leaves opposite, with stout petioles 3/8–3/4 inch long. Blades 4–10 inches long and 1 1/4–3 1/2 inches wide, short- or long-pointed at apex, short-pointed or blunt at base, not toothed on edges, with 3 main veins from base, often 1 pair of fine veins near margins, and fine spreading side veins, the upper surface dark green and hairless, and the lower surface densely covered with brown scale hairs and with prominent veins.

Flower clusters (panicles) large, 4–8 inches long, bearing many stalkless flowers on 1 side of many branches. The cup-shaped base (hypanthium) less than 1/8 inch long, densely scaly, bears the short calyx and other parts; corolla of 5 white petals 1/8 inch long; stamens 10 with short narrow anthers; and pistil with inferior ovary and slender style enlarged toward dotlike stigma. The fruits are covered with minute scales and have calyx at apex. Seeds few, brown, 1/16 inch long.

Rare in moist limestone region at 1,500 feet altitude. Found in Puerto Rico only near Lares and Utuado.

RANGE.—Puerto Rico, Hispaniola, and Cuba. Also from southern Mexico, Guatemala, and British Honduras to Costa Rica. Northern South America from Colombia and Venezuela and Trinidad to Brazil, Bolivia, and Peru.

OTHER COMMON NAMES.—auquey, auquey bobo, tresfilos, jau-jau, rajador (Dominican Republic); canilla de mula (Costa Rica); red maya, caperote, cirín (British Honduras).

606. Camasey *Miconia punctata* (Desr.) D. Don

Flowering twig (above), fruiting twig (below), two-thirds natural size.

607. Camasey ***Miconia pycnoneura* Urban**

A shrub or small tree of dwarf forests of mountain summits, distinguished by: (1) minute reddish brown scale (scurfy) hairs on the purplish stout 4-angled twigs, petioles, and branches of flower clusters; (2) opposite ovate to elliptic thick and leathery leaves with melastome venation, 5 main veins from base with very many side veins much sunken above and very prominent beneath in squarrish compartments; (3) flower clusters flattened and often broader than high, dense with many crowded purplish flowers nearly 1/4 inch long; and (4) round bluish berries 3/16 inch in diameter.

An evergreen shrub or small tree observed to 15 feet high and 3 inches in trunk diameter, recorded to 23 feet. Bark gray, slightly fissured, the inner bark brown and astringent. Twigs 4-angled or slightly flattened in internodes, becoming gray.

The opposite leaves have long purplish petioles 1 1/4–2 inches long. Blades are 3 1/2–5 1/2 inches long, 1 1/2–2 1/4 inches wide, short- or long-pointed at apex, rounded or slightly notched at base, not toothed on edges, the upper surface shiny green to dark green and hairless, with veins much sunken, and the lower surface dull light green with scale hairs on the very prominent purplish or pinkish veins.

Flower clusters (panicles like corymbs) are flattened, dark purple, to 3 inches high and 4 inches broad, bearing many flowers on stalks 1/8–1/4 inch long. The cup-shaped purplish base (hypanthium) less than 1/8 inch long bears 5 rounded calyx lobes and other parts; 5 purplish-tinged petals about 1/8 inch long; 10 white stamens; and pistil composed of inferior 3-celled ovary, slender style, and dotlike stigma. The fruits have calyx at apex and many minute brown triangular seeds. Collected with flowers in March and with fruits from March to July.

Wood whitish, hard.

Uncommon in dwarf forest on mountain tops at 3,000–4,390 feet altitude in Puerto Rico.

PUBLIC FORESTS.—Luquillo, Toro Negro.

RANGE.—Puerto Rico only.

607. Camascy *Miconia pycnoneura* Urban

Fruiting twig (above), flowers (below), natural size.

608. Camasey felpa ***Miconia racemosa*** **(Aubl.) DC.**

Perhaps the smallest of the native species of this genus, commonly a shrub in moist areas nearly throughout Puerto Rico and rarely becoming a small tree. Distinguishing characters are: (1) twigs hairless except for bristly hairs at ringed nodes; (2) opposite elliptic leaves finely saw-toothed hairy on edges and with tuft of hairs at base above, with melastome venation with veins much sunken, 5 main veins from base and many parallel side veins at an obtuse angle; (3) many flowers nearly $\frac{3}{16}$ inch long, with 5 whitish or slightly purplish petals, stalkless on upper side along branches of terminal flower cluster; and (4) shiny black berries $\frac{3}{16}$–$\frac{1}{4}$ inch in diameter.

An evergreen shrub 6–10 feet high, rarely becoming a small tree to 13–15 feet high and 3 inches in trunk diameter. Bark gray, smooth, the inner bark light gray, astringent. Twigs light green, slightly 4-angled, with hairs at the ringed nodes.

Leaves opposite, with stout petioles $\frac{3}{8}$–1 inch long. Blades $3\frac{1}{2}$–6 inches long and $1\frac{1}{2}$–3 inches wide, short- to long-pointed at apex, blunt with a tuft of hairs at base above, slightly curved and not flat, slightly thickened, the upper surface shiny light green and nearly hairless with veins much sunken, and the lower surface dull light green with much raised slightly hairy veins.

Flower clusters (panicles) terminal, 3–5 inches high, bearing many flowers on upper side of curved nearly horizontal branches. Flowers have cup-shaped light green base (hypanthium) $\frac{1}{16}$ inch long bearing calyx as a yellowish 5-toothed ring, 5 whitish or slightly purplish petals more than $\frac{1}{16}$ inch long, 10 purple stamens, and pistil with inferior 3-celled ovary and slender-style. Fruits (berries) slightly broader than long, whitish when immature, dark purple within, juicy, almost tasteless, containing many minute brownish seeds. Flowering and fruiting through the year.

The wood is light brown and hard.

Common and widespread in moist areas nearly throughout Puerto Rico in moist coastal, limestone, Luquillo, and Cordillera forest types from sea level to 3,000 feet altitude. Marshy areas and shale soils. Absent from Virgin Islands.

PUBLIC FORESTS.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Toro Negro.

RANGE.—Hispaniola, Puerto Rico, Dominica, Grenada, St. Lucia, Trinidad, Tobago, and from Venezuela to French Guiana.

OTHER COMMON NAMES.—terciopelo, camasey racimoso (Puerto Rico).

608. Camasey felpa

Miconia racemosa (Aubl.) DC.

Natural size.

609. Camasey ***Miconia rubiginosa* (Bonpl.) DC.**

This rare species of camasey in the western mountains is identified by: (1) rusty or brownish soft hairs covering twigs, petioles, lower leaf surfaces, branches of flower clusters, and flowers; (2) opposite ovate or elliptic leaves have melastome venation, 5 main veins from near base, with minute soft star-shaped hairs on lower surface, and with stout short petioles ¼–⅜ inch long; (3) many flowers stalkless in groups, about ¼ inch across the 5 elliptic petals, white and becoming light yellow; and (4) rounded blackish berries 3/16 inch in diameter.

An evergreen shrub or small tree reported to become 25 feet high and 4 inches in trunk diameter. Bark gray, finely furrowed.

The blades of the opposite leaves are 3–5¼ inches long and 1½–2¼ inches wide, slightly thickened and stiff, short- or long-pointed at apex, rounded or slightly notched at base, turned under along edges, with 5 main veins, including 1 pair of fine veins near margins and 1 pair joining midrib ⅛ inch above base, and many parallel side veins. The upper surface is dark green and nearly hairless, with veins sunken, and the lower surface paler, with raised veins, and soft cover of star-shaped hairs.

Flower clusters (panicles) are terminal, cone-shaped, branched, to 4–6 inches long. Flowers many, stalkless in groups, composed of cup-shaped yellowish hairy base (hypanthium) nearly ⅛ inch high, with 5-toothed hairy calyx; 5 elliptic petals more than 1/16 inch long, white, becoming light yellow; 10 stamens, and pistil with inferior 3-celled ovary containing many ovules and slender style. The blackish fruits are slightly flattened, have minute cup at apex, scattered hairs, and have juicy purplish black flesh, almost tasteless. Seeds many, light brown, nearly 1/16 inch long. Collected with flowers and fruits from January to August.

Rare in western mountains. Collected in clearing near Lares in lower Cordillera forest in western mountains, altitude 2,000 feet. Also found long ago near Utuado and Adjuntas.

PUBLIC FOREST.—Maricao.

RANGE.—Puerto Rico and Hispaniola. Also from Costa Rica and Panama to Guyana, Brazil, and Bolivia.

OTHER COMMON NAMES.—peralejo (Dominican Republic); friega-platos, canillo, canillo de cerro (Panama); oreja de mula (Venezuela).

Excluded species: *Miconia lanata* (DC.) Triana. Reported from Puerto Rico and Cuba nearly a century ago, apparently in error, and not found there afterwards. Characterized by the twigs, leaves on both surfaces, and flower clusters densely woolly hairy with star-shaped hairs. RANGE.—St. Vincent, Trinidad, and northern South America to Brazil and Bolivia.

609. Camasey *Miconia rubiginosa* (Bonpl.) DC.

Flowering twig (above), fruits (lower left), natural size.

610. Camasey ***Miconia serrulata*** **(DC.) Naud.**

This distinctive species of camasey, a shrub or small tree, is recognized by: (1) the very large opposite ovate to elliptic, slightly thickened leaves 5–12 inches long and 3–8½ inches wide, with melastome venation, 5 or 7 main veins from base, distinctly and finely wavy toothed on edges; (2) twigs, petioles, raised veins on lower leaf surface, branches of flower clusters, and flowers densely covered with cinnamon-brown or rusty scale hairs; (3) flowers about ¾ inch long, with cylindric base, spreading calyx, and 6 white petals; and (4) rounded berries ¼ inch in diameter, white to light blue.

An evergreen shrub 6–10 feet high or a small tree to 20 feet or more and 3 inches in trunk diameter. The bark is gray brown, finely fissured. Twigs stout, slightly flattened, covered with cinnamon-brown scaly hairs. Buds composed of rusty hairy paired minute leaves.

The opposite leaves have stout cinnamon-brown hairy petioles 1½–4½ inches long. Blades are long- or short-pointed at apex, rounded or slightly notched at base, the upper surface dull dark green and becoming nearly hairless, with 5 or 7 main veins and many straight parallel side veins all slightly sunken, and the lower surface whitish green and soft with star-shaped hairs and network of small rectangles bordered by raised cinnamon-brown hairy veins.

Flower clusters (panicles) terminal, large, 5–10 inches long, with many flowers mostly stalkless at ends of finely hairy branches. The cylindric base (hypanthium) 3/16 inch long is finely gray hairy and bears the slightly 6-toothed spreading calyx ⅛ inch long and the other parts; 6 oblong whitish petals, reported also to be pink, ¼ inch or more in length, scaly hairy outside; purplish curved stamens 6 long and 6 short; and pistil with inferior ovary and long curved whitish style. The finely scaly hairy fruits have spreading ring of calyx at apex, are juicy but tasteless, and contain many dark brown seeds less than 1/16 inch long. Flowering and fruiting mainly in spring and irregularly through the year.

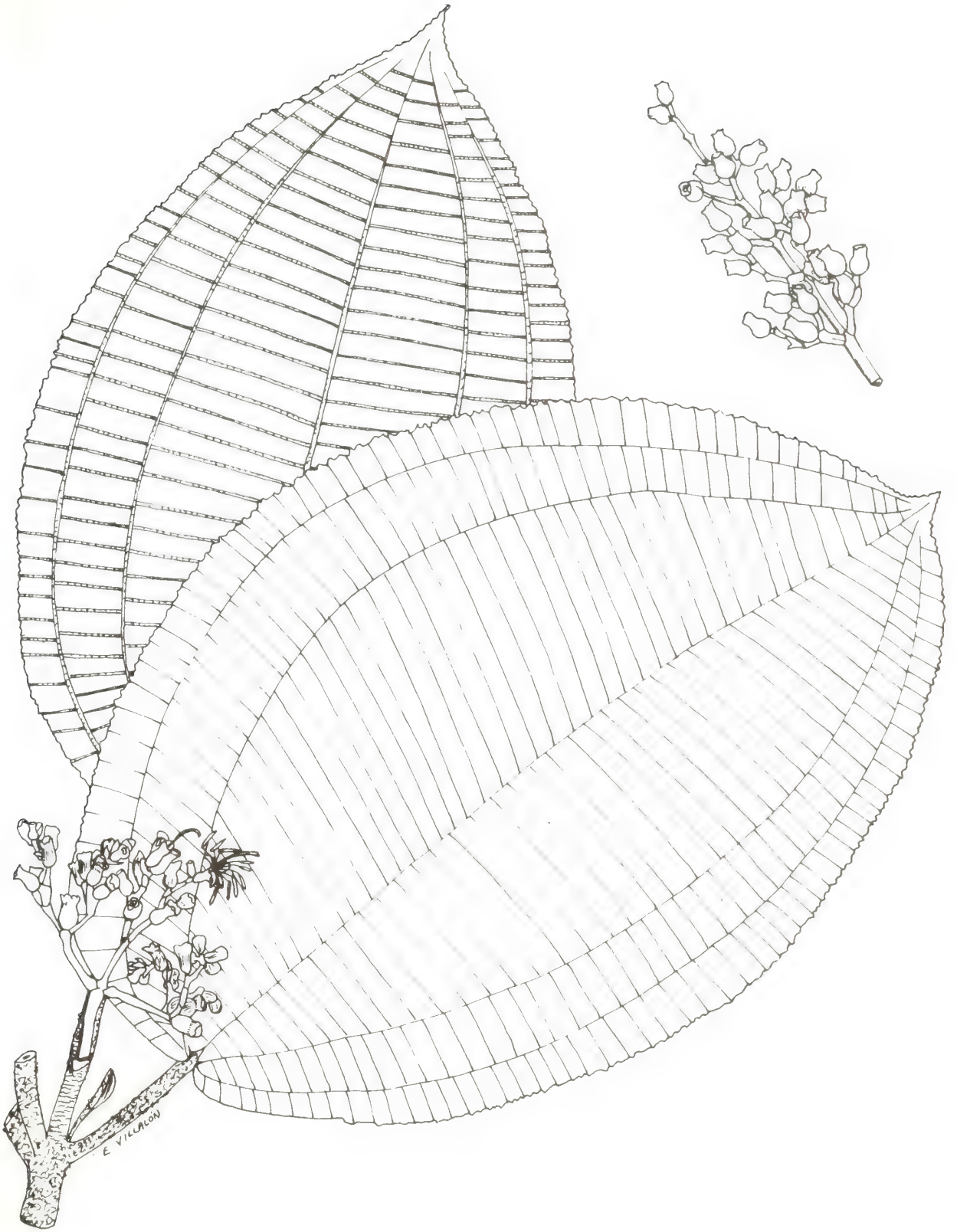
Uncommon in lower Luquillo and Cordillera forests from near sea level to 1,500 feet altitude, as in Luquillo foothills and from Fajardo west to Mayaguez. Also St. Croix and recorded long ago from St. Thomas.

PUBLIC FORESTS.—Luquillo, Maricao.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, St. Croix, and Trinidad. Also from Mexico to Panama and South America from Colombia to Brazil, Bolivia, and Peru.

OTHER COMMON NAMES.—jau-jau, auguey (Dominican Republic); tesuate (Mexico); lengua de vaca (Costa Rica); tuno (Colombia); morito, canilla de venado (Venezuela); rifari (Peru); white maya (British Honduras).

BOTANICAL SYNONYMS.—*Miconia macrophylla* (D. Don) Triana, not Steud., *Tamonea macrophylla* (D. Don) Krasser.



610. Camasey *Miconia serrulata* (DC.) Naud.

Flowering twig (left) and fruits (upper right), two-thirds natural size.

611. Camasey ***Miconia sintenisii* Cogn.**

This shrub or small tree known only from high mountains of Puerto Rico is recognized by: (1) opposite ovate to elliptic thickened and stiff leaves with melastome venation, 5 main veins from base, also 2 smaller veins near the turned under finely toothed borders and many straight cross veins, not flat but bent into 2 long ridges between midvein and 2 main side veins, all these and smaller veins deeply sunken in delicate pattern of small rectangles, the lower surface with raised cinnamon-brown hairy veins; (2) many flowers nearly ½ inch long and broad, with 5 whitish petals in large long-stalked terminal clusters; and (3) rounded berries 5/16–½ inch in diameter changing from purple to light blue.

An evergreen shrub or tree to 20–25 feet high and 4 inches in trunk diameter. The bark is gray and smooth, the inner bark light gray, whitish within, astringent. Young twigs, buds, petioles, and veins on lower leaf surface are covered with cinnamon-brown scale hairs. Twigs stout, with ringed nodes, light green with raised dots (lenticels), becoming nearly hairless, ending in narrow bud of folded young leaves.

Leaves opposite, with stout round petioles ¾–2 inches long, greenish to pinkish or purplish. Blades 3½–7½ (10) inches long and 1¾–3¾ inches wide, short- to long-pointed at apex, slightly notched or rounded at base, the hairless upper surface slightly shiny green to dark green, and the lower surface dull light green.

Flower clusters (panicles) 3–10 inches long bear many flowers mostly in 3's on stout stalks of ¼ inch or less. The light green bell-shaped base (hypanthium) nearly ¼ inch long encloses the inferior ovary and bears the other parts; calyx of 5 broad lobes less than 1/16 inch long; 5 whitish oblong concave petals 5/16 inch long, turning back and falling early; 10 white stamens; and pistil with inferior 5–6-celled ovary containing many ovules and slender white style. The rounded mature fruits become 5/16–½ inch long and wide, have 5 calyx lobes at apex, juicy slightly sweet flesh, and numerous light brown seeds less than 1/32 inch long. Flowering and fruiting probably through the year.

The wood is light brown, hard, and lightweight.

Uncommon in dwarf forest at 2,500–4,000 feet altitude in high mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from high mountains of Puerto Rico.

This species was named in 1886 for P. Sintenis, the botanical explorer who discovered it the year before.

611. Camasey *Miconia sintenisii* Cogn.

Twig with flowers and immature fruits (above), fruits (lower left), natural size.

612. Camasey ***Miconia subcorymbosa* Britton**

This shrub or small tree rare in the central mountains is identified by: (1) opposite oblong to oblong-lanceolate leaves hairless or nearly so, with melastome venation, 5 main veins from base but 2 near margins; (2) many flowers $\frac{5}{16}$ inch long, with 5 white petals; and (3) round berries, $\frac{1}{4}$ inch in diameter, blue or turning white.

An evergreen shrub or small tree to 18 feet high and 4 inches in trunk diameter, recorded to 33 feet, becoming hairless or nearly so.

Leaves opposite, with petioles $\frac{3}{4}$–$1\frac{1}{2}$ inches long. Blades 3–$6\frac{1}{2}$ inches long and $\frac{3}{4}$–2 inches wide, long-pointed at apex, short-pointed or rounded at base, not toothed on margins, hairless or nearly so, with many fine cross veins, the upper surface shiny green, and the lower surface paler.

Flower clusters (panicles) 1–4 inches long, broad, slightly flattened, about as long as leaves, bearing many flowers on slender stalks $\frac{1}{8}$–$\frac{5}{16}$ inch long. The bell-shaped base (hypanthium) more than $\frac{1}{8}$ inch long bears 5 pointed calyx lobes and the other parts; 5 white petals more than $\frac{1}{8}$ inch long; 10 stamens; and pistil with inferior 5-celled ovary and slender style. The fruits reported to be reddish when immature, becoming blue or turning white, with calyx at apex. Seeds many, minute. Flowering and fruiting mostly in spring and summer but through the year.

Rare in lower Cordillera forest at 2,500 feet altitude in central mountains of Puerto Rico.

PUBLIC FORESTS.—Maricao, Toro Negro.

RANGE.—Puerto Rico and Cuba. An early report from Hispaniola lacks confirmation.

612. Camasey *Miconia subcorymbosa* Britton

Flowering twig (above), fruits (lower left), natural size.

613. Camasey ***Miconia tetrandra* (Sw.) D. Don**

This species of camasey is a small to medium-sized tree common in mountain forests. It is identified by: (1) minute brownish scaly hairs on young twigs, petioles, branches of flower clusters, and flowers; (2) opposite elliptic to lanceolate leaves with melastome venation, 3 main veins from base, slightly thickened and rolled under at margins; (3) flowers about 1/4 inch long, with 4 white (or greenish) petals 1/16 inch long and 4 stamens (as the scientific name emphasizes) mostly stalkless, very numerous in terminal clusters; and (4) purplish or black round berries nearly 3/16 inch in diameter.

An evergreen tree 20–60 feet high and 4–12 inches in trunk diameter. Bark light gray, smoothish or slightly fissured. The inner bark is light orange yellow, streaked, astringent. Twigs 4-angled, gray or brown, slightly ringed at nodes. Buds composed of paired narrow folded gray-green young leaves.

Leaves opposite, with light brown petioles 5/8–1 inch long. Blades 3–7 1/2 inches long and 1 1/4–2 inches wide, long- or short-pointed at apex, rounded or short-pointed at base, with the 3 main veins slightly sunken, often 1 pair of fine veins near margins, and many fine straight side veins, appearing hairless but with minute scattered scales, the upper surface slightly shiny green, and the lower surface dull light green.

Flower clusters (panicles) terminal, 3–5 inches long, bearing very numerous flowers mostly stalkless in groups of 3 at ends of short branches. The bell-shaped base (hypanthium) 1/16 inch long, brownish green and covered with minute scales, encloses the inferior ovary and bears the other parts; calyx slightly 4-toothed; corolla of 4 spreading elliptic white (or greenish) petals 1/16 inch long; 4 white stamens 1/8 inch long; and pistil with inferior 3-celled ovary containing many tiny ovules and slender white style. The fruits with ring calyx at apex are juicy and slightly sweet and contain many light brown seeds less than 1/16 inch long. Recorded with flowers from January to July and with fruits from March to August.

The wood is light brown, hard, and moderately heavy.

Common in lower Luquillo and Cordillera forests at 1,500–3,000 feet altitude in Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico. Also Lesser Antilles in Guadeloupe, Dominica, and Grenada. There is an old record from Trinidad.

OTHER COMMON NAMES.—rajador, yarador (Dominican Republic).

613. Camasey *Miconia tetrandra* (Sw.) D. Don

Fruiting twig (above), flowers (lower left), natural size.

614. Camasey tomaso ***Miconia thomasiana* DC.**

This shrubby species of camasey, which sometimes is a small tree, is identified by: (1) opposite elliptic leaves with melastome venation, 5 main veins including 1 pair of fine veins near margin and 1 pair joining midvein $\frac{1}{8}$–$\frac{1}{2}$ inch above base, petioles with red bristly hairs; (2) flowers more than $\frac{5}{8}$ inch across the 5 pink rounded petals, on very slender stalks $\frac{1}{2}$–$\frac{3}{4}$ inch long in terminal clusters; and (3) purplish black berries $\frac{3}{16}$–$\frac{1}{4}$ inch in diameter, with long dark red hairs.

An evergreen shrub 6–10 feet high or sometimes a small tree to 15 feet high and 3 inches in trunk diameter. Bark gray, smooth. Young twigs pink, with scattered minute light brown scale hairs. Buds composed of dark red paired young leaves.

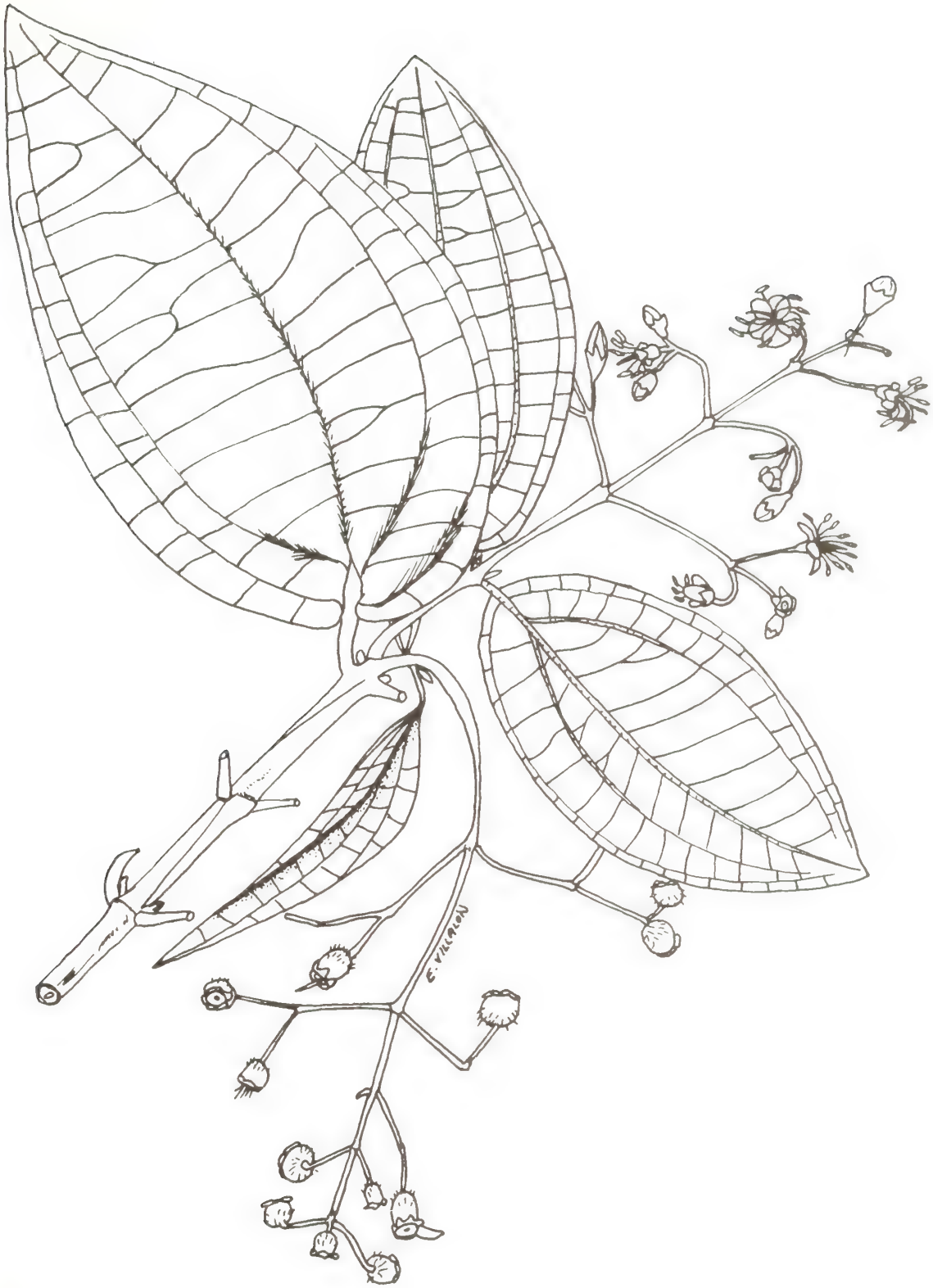
Petioles of the opposite leaves are about $\frac{1}{2}$ inch long, pinkish, and have 2 rows of red bristly hairs above. Blades are 2–6 inches long and 1–3 inches wide, slightly thickened, hairless, short- or long-pointed at apex, rounded or slightly notched at base, the edges slightly turned under and sometimes with few minute teeth, not flat but slightly curved up from midrib. The upper surface is shiny green and has the 3 largest veins much sunken, and the lower surface is dull light green with prominent veins.

Flowers clusters (panicles) are terminal, as long as leaves or longer, bearing several to many flowers on very slender widely forking branches. The bell-shaped base (hypanthium) $\frac{1}{8}$ inch long is green, pinkish tinged, with long red hairs and bears the pink calyx with 5 rounded spreading lobes $\frac{1}{16}$ inch long and the other parts; 5 pink nearly round petals $\frac{1}{4}$–$\frac{5}{16}$ inch long; 10 very long and narrow pink stamens; and pistil with inferior 4–3-celled ovary and slender curved whitish style. Berries green to pink to purplish black at maturity, with pink 5-lobed calyx spreading at apex. Seeds several, $\frac{1}{16}$ inch long, shiny brown. Collected with flowers and fruits from March to September.

Locally common in moist coast and lower Cordillera forests from sea level to 2,000 feet altitude on eastern and northern coast and western mountains of Puerto Rico. Also Sage Mountain, Tortola. Reported long ago from St. Thomas and named from that island, apparently in error.

PUBLIC FORESTS AND PARK.—Maricao, Susúa, Toro Negro; Sage Mountain.

RANGE.—Known only from Puerto Rico and Tortola.



614. Camasey tomaso

Miconia thomasiana DC.

Natural size.

615. Murta ***Mouriri domingensis*** **(Tuss.) Spach**

This tree of the moist coastal forest is identified by: (1) opposite ovate leaves 2–3½ inches long and ⅞–2 inches wide, appearing flat in 2 rows; (2) flowers about ½ inch across the 5 spreading pink petals, several at base of a leaf; and (3) fruit an orange rounded berry ⅝–1¼ inches in diameter, edible.

An evergreen tree to 55 feet high and 10 inches in trunk diameter. Bark light brown gray, finely fissured, the inner bark red and bitter. Twigs slender, brown, hairless, with rings at nodes.

Leaves opposite, hairless appearing flat in 2 rows from twisting of twig and petioles, which are ⅛ inch long. The blades are long-pointed at apex, rounded at base, not toothed on edges, thin, the side veins few, very fine, and scarcely visible, the upper surface shiny dark green, and the lower surface green and slightly shiny.

Flowers are clustered several at base of a leaf on stalks less than ¼ inch long. The top-shaped base (hypanthium) and 5-lobed calyx are about ⅛ inch long; the 5 narrow spreading pink petals are 3/16 inch long; stamens 10, longer than petals; and pistil with inferior ovary and long slender style. The fruit is an orange rounded berry wider than long, with ring of calyx on side, juicy, slightly sweet, and edible. Seeds 1–3, elliptic, ⅜ inch long, brown. Flowering and fruiting in spring and summer.

The wood, described as yellowish, hard, and fine-textured, has been used elsewhere in cabinetmaking.

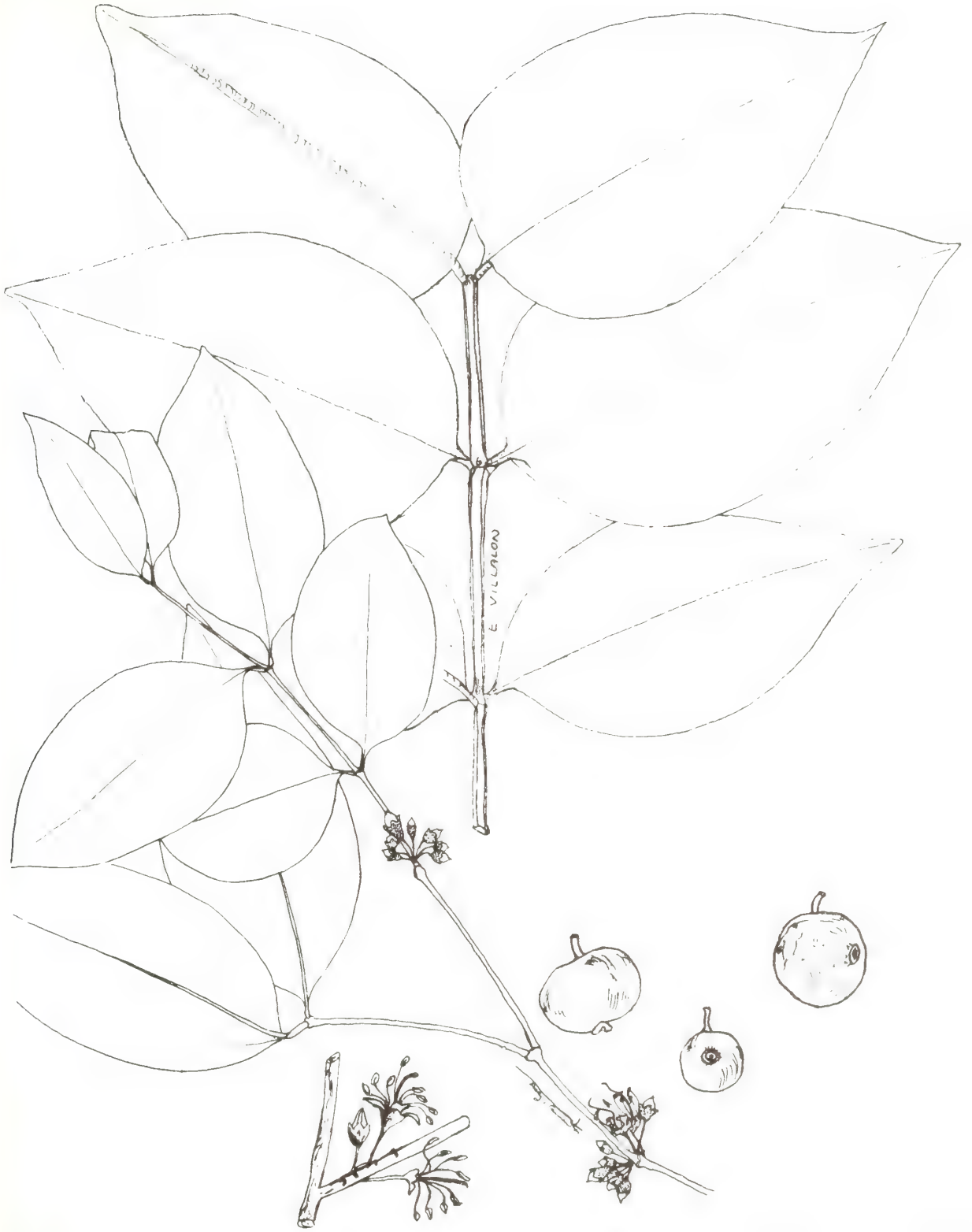
This species is sometimes cultivated as an ornamental for the shiny leaves and orange fruits.

Rare in moist coastal forest to 300 feet altitude in Puerto Rico. Collected also in Luquillo Mountains at 2,500 feet altitude. Also in Vieques and St. Croix.

RANGE.—Hispaniola, Puerto Rico, St. Croix, Antigua, and Guadeloupe.

OTHER COMMON NAMES.—caimitillo, guasávara (Puerto Rico); guayaba cimarrona, piragua (Dominican Republic); cormier (Haiti).

The generic name has been spelled *Mouriria* also.



615. Murta *Mouriri domingensis* (Tuss.) Spach

Leafy twig (above), flowering twig and flowers (lower left), fruits (lower right), natural size.

616. Mameyuelo ***Mouriri helleri* Britton**

This shrub or sometimes a medium-sized tree is characterized by: (1) opposite obovate or elliptic dark green leaves $\frac{3}{4}$–$1\frac{1}{2}$ inches long and $\frac{3}{8}$–$\frac{3}{4}$ inch wide, with edges turned under and without visible side veins; (2) star-shaped flowers $\frac{1}{2}$ inch across the 5 spreading pinkish petals, 1–3 on slender stalks at base of a leaf; and (3) fruit an orange rounded berry $\frac{3}{8}$–$\frac{7}{16}$ inch in diameter.

An evergreen shrub 6–10 feet high or sometimes a tree to 60 feet high and 10 inches in trunk diameter, much branched. The bark is gray, thin, rough with many fissures, the inner bark pinkish or brownish and tasteless or slightly bitter. Twigs are brown, slender, hairless, slightly 4-angled when young.

The opposite hairless leaves have very short petioles about $\frac{1}{16}$ inch long. Blades are rounded or blunt at apex, short-pointed at base, slightly thick and leathery, with midvein but without visible side veins, the upper surface dark dull green, and the lower surface light green.

Flowers mostly few at leaf bases or, in a form at Susúa Forest, 20 or more in small terminal clusters (panicles). The flowers have slender stalks $\frac{1}{8}$–$\frac{3}{8}$ inch long, jointed in middle. The tubular funnel-shaped base (hypanthium) and 5-lobed calyx are $\frac{3}{16}$ inch long; there are 5 narrow spreading petals $\frac{3}{16}$ inch long, pinkish or whitish tinged with pink; 10 stamens about $\frac{1}{4}$ inch long; and pistil with inferior 2-celled ovary and long slender style $\frac{3}{8}$ inch long. The fruit is a berry, rounded but slightly broader than long, with calyx at apex and with 1 or more shiny brown seeds. With flowers and fruits from spring to fall.

The wood is light brown and hard.

Scattered in moist limestone and lower Cordillera forests from sea level to 2,500 feet altitude, north coast and western and northwestern mountains.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Puerto Rico and Hispaniola (Dominican Republic).

BOTANICAL SYNONYMS.—*Mouriri samanensis* Urban; M. *helleri* var. *samanensis* (Urban) Morley.

Discovered by Amos Arthur Heller (1867–1944), botanist of the United States, who made large plant collections in Puerto Rico in the years 1899 and 1900. Formerly restricted to Puerto Rico. However, a related species from eastern Hispaniola has been united as a variety. The common name mameyuelo recorded for this species is in more general use in the genus *Ardisia*.

616. Mameyuelo

Mouriri Kellen Britton

Flowering twig (upper left), fruiting twig (lower right), natural size.

617. ***Ossaea krugiana* Cogn.**

A rare shrub or small tree known only from mountain forests of central Puerto Rico. Distinguished by: (1) opposite leaves with melastome venation, ovate to elliptic, with 5 main veins from base and with finely saw-toothed edges; (2) short stout stiff scalelike hairs forming rough surfaces on twigs, petioles, leaf blades, and branches of flower clusters; and (3) few flowers about ¼ inch long, with 5–6 pink or red petals, in lateral clusters.

An evergreen shrub 6–10 feet high or a small tree to 15 feet high and 3 inches in trunk diameter. Twigs slender, rough with pressed scalelike hairs.

Leaves opposite, with petioles ¼–1¼ inches long. Blades 1½–4 inches long and 1–2 inches wide, long-pointed at apex, rounded at base, with finely saw-toothed edges, thin, both surfaces rough with stiff hairs, the upper surface green with conic hairs, and the lower surface light green with many raised parallel side veins.

Flowers in small short-stalked clusters (cymes) at base of leaves. The basal tube (hypanthium) nearly ⅛ inch long bears the 5–6-toothed calyx, 5–6 rounded pink or red petals ⅛ inch long, 10 or 12 stamens with yellow anthers, and slender style, and encloses the inferior ovary. Immature fruit a small rounded greenish berry 3/16 inch in diameter, covered with scalelike hairs, with calyx at apex. Collected with flowers in June and July.

Rare in upper Cordillera forest at 3,000–4,000 feet altitude in central mountains of Puerto Rico. Discovered near Adjuntas in 1886 and rediscovered in Toro Negro Forest in 1941.

PUBLIC FORESTS.—Guilarte, Toro Negro.

RANGE.—Known only from Central Cordillera of Puerto Rico.

617. *Ossaea krugiana* Cogn.

Twigs with immature flowers, natural size.

618. Stinking-fish ***Tetrazygia angustifolia*** **(Sw.) DC.**

This small tree of the Virgin Islands, also rare in Puerto Rico, is characterized by: (1) opposite very narrow, lanceolate leaves with melastome venation, 3 main veins from base and parallel cross veins like a ladder, the lower surface whitish hairy with raised brownish veins; (2) twigs, petioles, lower leaf surfaces, branches of flower clusters, and flowers covered with minute gray star-shaped hairs; (3) many crowded flowers in flat-topped terminal clusters, 1/4 inch long and broad, the petals purplish or pinkish tinged; and (4) round blue-black berries 3/16 inch in diameter.

An evergreen small tree commonly 20 feet high and 4 inches in trunk diameter, often shrubby, and recorded to 40 feet. Bark light gray, rough with many narrow furrows, the inner bark light brown, slightly astringent. Twigs much branched, slender, covered with minute brown star-shaped hairs.

Leaves opposite, with slender petioles 3/16–3/8 inch long. Blades 1 1/2–2 inches long and 1/4–1/2 inch wide, very long-pointed at apex, short-pointed at base, not toothed on edges, thin, the upper surface dull light green and becoming almost hairless, with the 3 long veins sunken.

Flower clusters (panicles) much branched, flattened, 1–2 inches long and broad. The flowers have stalks of about 1/16 inch. The light brown tubular base (hypanthium) more than 1/16 inch long bears the 4-lobed calyx 1/16 inch long, 4 purplish or pinkish petals less than 1/8 inch long, 8 purplish stamens, and long slender style and encloses the inferior ovary of pistil. The fleshy berry has spreading ring of calyx at apex and contains many minute seeds. Flowering and fruiting in summer and fall.

The wood is light brown and hard.

Local and scattered in moist coastal forest and foothills of Cordillera from sea level to 1,000 feet altitude in northeastern, southeastern and northwestern Puerto Rico. Also in Virgin Islands, including St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC PARKS.—Virgin Islands, Sage Mountain, Gorda Peak.

RANGE.—Hispaniola, Puerto Rico, Virgin Islands, Antigua, Montserrat, Guadeloupe, Dominica, and Martinique.

OTHER COMMON NAMES.—stinking-fish (Virgin Islands); cre-cre blanc (Dominica); bois côtelette (Guadeloupe).

618. Stinking-fish *Tetrazygia angustifolia* (Sw.) DC.

Fruiting twig (above), flowering twig (below), natural size.

619. Camasey ***Tetrazygia biflora*** **(Cogn.) Urban**

Three species, this and the next 2, known only from mountains of Puerto Rico, have also been placed together in a separate genus (*Menendezia*). They are distinguished by many large showy white 4-parted flowers in terminal clusters, 3 or fewer stalkless at the end of a flattened branch, which is broadest and to 1/8 inch wide at end. This species is further characterized by: (1) opposite narrowly elliptic leaves ending in an abrupt point, with melastome venation, 5 main veins from base, the lower surface light green with minute scale hairs, not whitish gray as in related species; and (2) large white flowers 1–1/2 inch across the 4 (or 5) spreading petals.

An evergreen tree to 50 feet high and 1 foot in trunk diameter. Bark gray, finely fissured and becoming slightly shreddy, the inner bark light brown and slightly sour. Twigs are slightly 4-angled, ringed at nodes, gray green and minutely hairy when young, becoming brown.

Leaves opposite, with finely hairy gray-green petioles 3/8–1 inch long. Blades 2–5 inches long and 3/4–2 inches wide, slightly thickened, long-pointed at apex, short-pointed or rounded at base, not toothed on edges, with 5 main veins from base and many straight parallel smaller veins. The upper surface is slightly shiny, green, becoming hairless, with veins slightly sunken, and the lower surface light green with raised brown veins and minute scale hairs.

Flower clusters (panicles) terminal, 2–4 inches long, bearing many fragrant flowers 3 or fewer stalkless at the end of a flattened finely hairy branch 1/2–1 inch long. The flower about 3/4 inch long is composed of bell-shaped base (hypanthium) 1/4 inch long, yellow green and scaly hairy, slightly narrowed above inferior ovary, bearing calyx with 4 (sometimes 5) spreading pointed lobes 3/16 inch long and the other parts; petals 4 (sometimes 5, rarely 6), white, 1/2 inch long and broad but slightly unequal, reverse heart-shaped and notched at apex; stamens twice as many as petals, with long orange or yellow anthers curved to 1 side; and pistil with inferior ovary 4-celled (sometimes 5-celled) containing many ovules, and slender curved style.

Immature fruits 1/4 inch or more in diameter, broader than long, yellow green, slightly 4-lobed (or 5-lobed), with calyx at apex, containing many narrow seeds less than 1/16 inch long. Collected with flowers from May to September and with fruits in August–September.

The wood is light brown and hard.

The trees of the three species of this genus are very showy when covered by the abundant large white flowers and perhaps merit cultivation as ornamentals.

Local and scattered in middle to upper Cordillera and Luquillo forests at 1,500–3,000 feet altitude from near Barranquitas and westward in Central Cordillera.

PUBLIC FORESTS.—Guilarte, Luquillo, Toro Negro.

RANGE.—Known only from eastern and central mountains of Puerto Rico.

BOTANICAL SYNONYMS.—*Menendezia biflora* (Cogn.) Urban, *Tetrazygia krugii* Cogn.

619. Camasey *Tetrazygia biflora* (Cogn.) Urban

Flowering twig (above), fruits (lower right), natural size.

620. Camasey ***Tetrazygia stahlii* Cogn.**

This species of camasey is closely related to No. 621, *Tetrazygia urbanii* Cogn., and possibly not distinct, differing in the very narrow longer outer calyx lobes. Other characters are: (1) 3 or fewer stalkless flowers at end of flattened branch of terminal cluster, the calyx of 4 very narrow lobes; (2) lanceolate to ovate leaves with very long narrow point at apex, with melastome venation, 5 main veins from base; and (3) minute whitish-gray scale hairs on young twigs, petioles, lower leaf surfaces, flower stalks, and flowers.

An evergreen tree recorded as 30–65 feet high and to 1 foot in trunk diameter. Twigs slender, slightly flattened when young, whitish gray hairy, ringed at nodes.

Leaves opposite, with petioles ⅜–¾ inch long. Blades 2–5½ inches long, ¾–1¾ inches wide, slightly thickened, short- or long-pointed at apex, blunt or rounded at base, not toothed on edges, with 5 main veins from base and many straight parallel side veins, the upper surface dull green to dark green, and the lower surface whitish gray and covered with minute scale hairs and with prominent veins.

Flower clusters (panicles) terminal, narrow. The flowers have a bell-shaped base (hypanthium) 3/16 inch long, gray hairy, which encloses the 4-angled inferior ovary and bears the other parts; calyx of 4 very narrow lobes ¼ inch long; 4 obovate white petals ⅜ inch long; and 8 stamens with long yellow anthers. Fruits about ¼ inch broad, deeply 4-lobed, with scale hairs, and with calyx at apex. Collected with flowers in May and June and with fruits in June.

The showy white flowers suggest that this species has possibilities as an ornamental.

Uncommon in lower Luquillo and lower and upper Cordillera forests at 1,000–3,000 feet altitude.

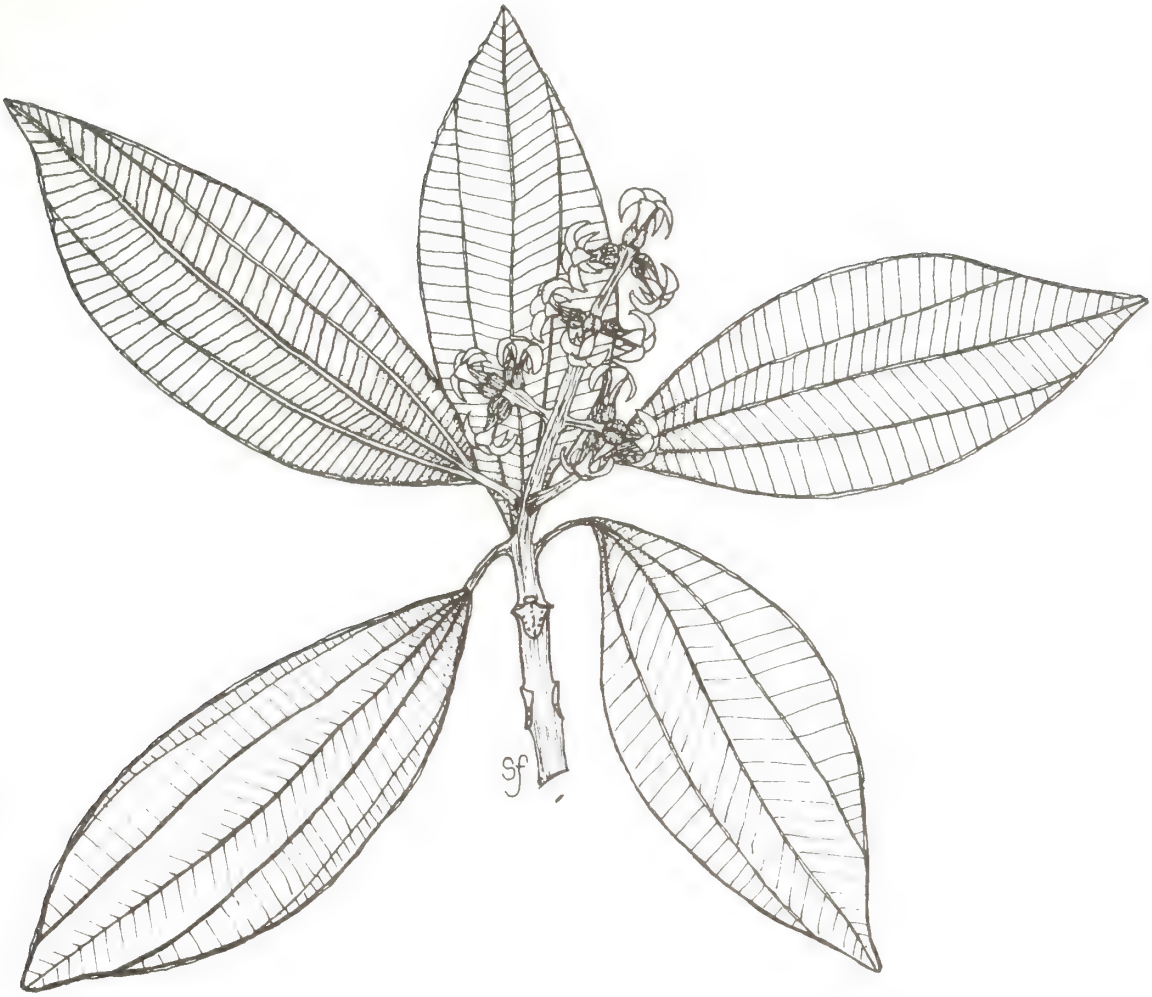
PUBLIC FORESTS.—Carite, Luquillo, Toro Negro.

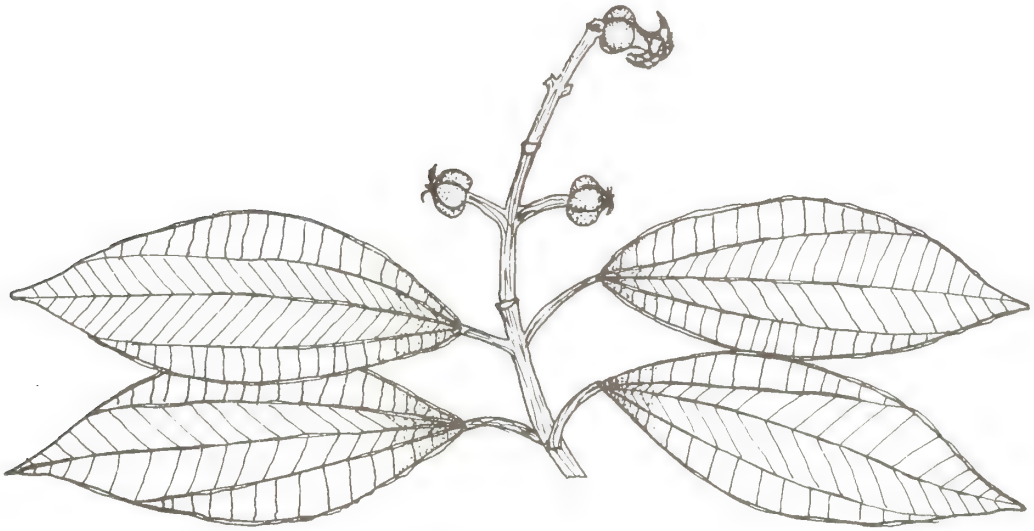
RANGE.—Known only from eastern and central interior of Puerto Rico.

OTHER COMMON NAME.—cenizo (Puerto Rico).

BOTANICAL SYNONYM.—*Menendezia stahlii* (Cogn.) Britton.

Named for Agustín Stahl (1842–1917), physician and botanist of Bayamón, author of an unfinished flora of Puerto Rico (*74*).





620. Camasey *Tetrazygia stahlii* Cogn.

Flowering twig (above), fruits (below), natural size.

621. Camasey ***Tetrazygia urbanii* Cogn.**

This species of camasey is distinguished by: (1) many showy white flowers $\frac{5}{8}$ inch across the 4 spreading petals, 3 or fewer stalkless at end of flattened branch of terminal cluster, the calyx of 4 short broad pointed lobes; (2) opposite narrowly elliptic or lanceolate leaves tapering to very long point at apex, with melastome venation, 5 main veins from base, the lower surface whitish gray hairy; and (3) minute pale whitish or light brown scale hairs on young twigs, petioles, lower leaf surfaces, flower stalks, and flowers.

An evergreen small tree to 33 feet high and 6 inches in trunk diameter or shrubby. Bark gray, slightly fissured, the inner bark orange brown and astringent. Twig 4-angled, covered with minute scale hairs, whitish gray, turning to brown, the nodes ringed and becoming slightly enlarged, with large raised half-round leaf scars. Buds composed of minute scaly paired leaves.

Leaves opposite, with petioles $\frac{1}{4}$–$1\frac{1}{4}$ inches long. Blades $2\frac{1}{2}$–$5\frac{1}{4}$ inches long and $\frac{3}{4}$–$1\frac{3}{4}$ inches broad, slightly thickened, rounded or short-pointed at base, not toothed on edges, with 5 main veins from base including 1 vein along each border and many straight parallel side veins, the upper surface dull green and hairless, and the lower surface whitish gray with raised veins and covered with minute scale hairs.

Flower clusters (panicles) terminal, 2–3 inches long bearing many fragrant flowers, 3 or fewer stalkless at end of flattened branch. The bell-shaped base (hypanthium) $\frac{3}{16}$ inch long, whitish green and covered with scale hairs, encloses the 4-lobed inferior ovary and as a narrow tube bears the other parts; calyx of 4 broad pointed lobes $\frac{1}{8}$–$\frac{3}{16}$ inch long, which covered bud and turn backward; 4 elliptic white petals $\frac{1}{4}$–$\frac{5}{16}$ inch long, slightly unequal; 8 stamens with long narrow yellow anthers bent to 1 side; and pistil with inferior 4-celled ovary containing many ovules, slender curved style, and dot stigma. Immature fruits nearly $\frac{1}{4}$ inch broad, deeply 4-lobed, hairy, with calyx at apex. Flowering in late spring and summer.

The wood is very light brown, hard, and moderately heavy.

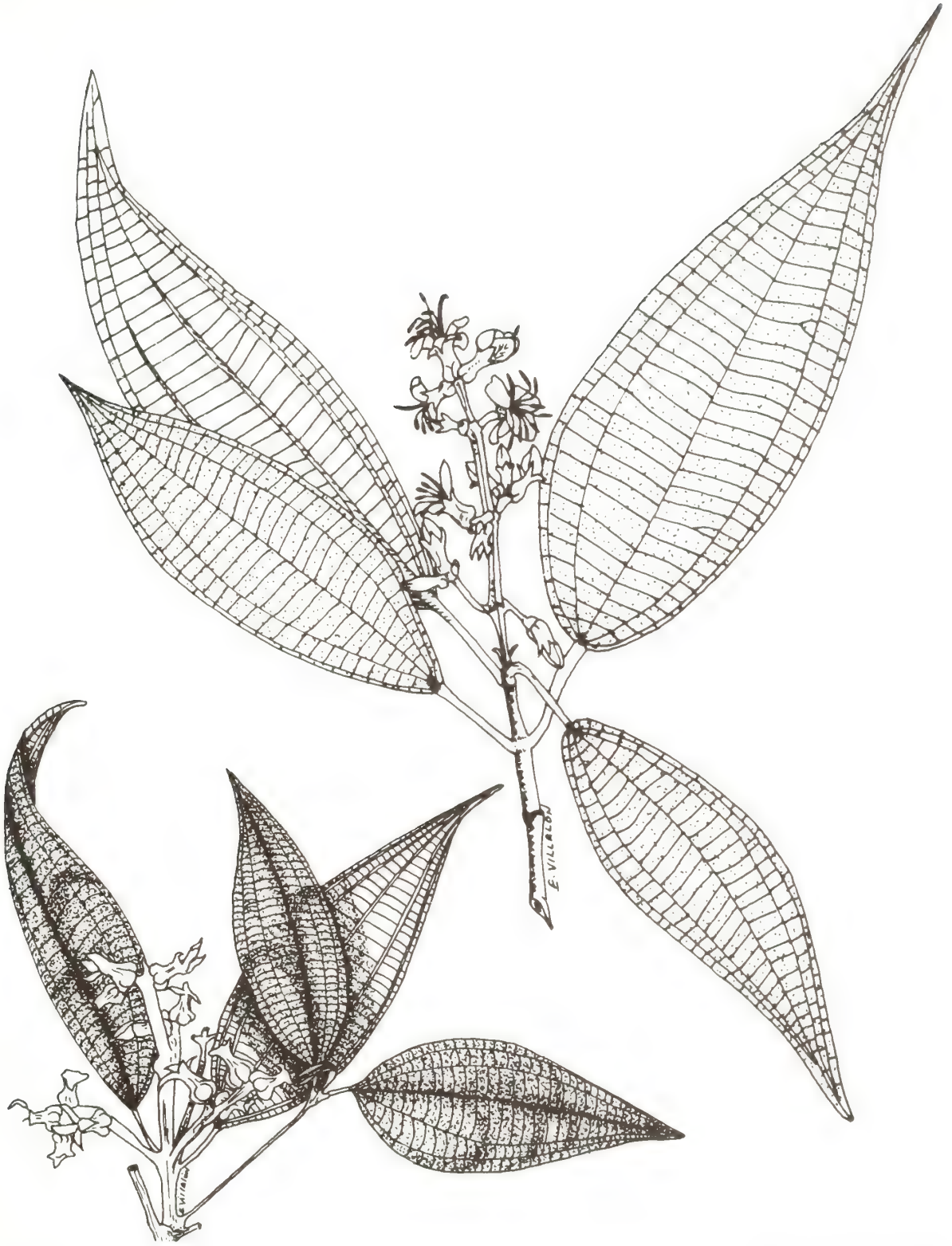
This species with its showy white flowers has possibilities as an ornamental.

Rare in lower Luquillo forest at 1,000–2,000 feet altitude.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquillo Mountains of eastern Puerto Rico.

BOTANICAL SYNONYM.—*Menendezia urbanii* (Cogn.) Britton.



621. Camasey *Tetrazygia urbanii* Cogn.

Flowering twig (above), fruiting twig (below), natural size.

622. Glorybush ***Tibouchina granulosa*** **(Desr.) Cogn.***

This handsome ornamental with large purple to violet flowers is distinguished by: (1) hairy, broadly 4-winged twigs with ring of bristly hairs at nodes; (2) paired lanceolate or narrowly elliptic leaves with 5 main veins from base; (3) many flowers 2–2½ inches across the 5 spreading petals; and (4) fruit an elliptic pinkish hairy capsule ⅜ inch long.

An evergreen shrub or small tree to 40 feet high and 8 inches in diameter. Bark gray, smoothish to fissured or furrowed. Twigs greenish and hairy, the 4 wings bordered by short stiff hairs.

The opposite leaves have brownish hairy petioles ½–¾ inch long. Blades are 3½–6 inches long and 1–1¾ inches wide, long-pointed at apex and blunt at base, slightly turned under at edges, slightly thickened, with melastome venation of 5 main veins from base and sunken, the dark shiny green upper surface with rough stiff hairs, the lower surface dull light green with sparse pressed hairs, especially on the raised veins.

Flower clusters (panicles) are erect, terminal, branched, to 7 inches long. Flowers on short pinkish hairy stalks, composed of pinkish which bears short calyx with 5 narrow purplish lobes, 5 purple to violet petals 1–1½ inches long and broadest near apex, 10 threadlike, very hairy stamens bent in middle, and pistil with inferior 5-celled ovary, many ovules, and threadlike curved style. Capsules 5-celled, with many minute brown seeds. Flowering and fruiting nearly through the year.

A relatively recent introduction, becoming common around homes in moist areas of Puerto Rico. Popular also in southern Florida.

RANGE.—Native of Brazil (Minas Gerais to Paraná) and Bolivia.

OTHER COMMON NAMES.—glorybush, purple glorytree (United States); quaresma, quaresmeira-paulista (Brazil).

GINSENG FAMILY (ARALIACEAE)

Shrubs and trees, sometimes large or unbranched, also woody vines and epiphytes and few herbs, known by: (1) leaves alternate, large, crowded at apex of few stout twigs, palmately compound (digitate) or simple and mostly entire or palmately lobed, or rarely bi- or tripinnate, with usually thickened blades, often with star-shaped hairs, with petioles mostly long but often also short, and with stipules often forming a sheath: (2) flowers minute, greenish, yellowish, or whitish, in heads or umbels, generally compound, bisexual or unisexual (dioecious), regular, with 5-toothed calyx, 5 (–10) petals from a disk, 5 (–10) stamens alternate with petals, and pistil with inferior ovary of 2–5 (1–15) cells each with 1 ovule, and 2–5 styles sometimes united; and (3) fruit a berry. Also vol. 1, p. 426.

Key to species

A. Leaves simple—*Dendropanax.*
  B. Leaves with additional fine veins parallel to side veins, dull green beneath; flower clusters (raceme of umbels) ball-like on branches along main axis—200. Pollo, *Dendropanax arboreus* (L.) Decne. & Planch.
  BB. Leaves with network of raised veins on shiny green lower surface; flower clusters (compound umbels) branched on branches at end of axis—624. *Dendropanax laurifolius.*
AA. Leaves compound.
  C. Leaves pinnate, with large ovate to elliptic or nearly round leaflets, mostly with short pointed teeth and white margined or blotched—626. *Polyscias guilfoylei.**
  CC. Leaves palmately compound (digitate).
    D. Leaves with 7–12 oblong or elliptic hairless leaflets 6–12 inches long; flowers dark red, crowded in heads along many dark purple axes—623. *Brassaia actinophylla.**
    DD. Leaves with oblong leaflets hairy beneath at least when young; flowers brownish or yellowish green in much-branched clusters—*Didymopanax.*
      E. Leaflets mostly 10 or 11, 10–17 inches long, long-pointed, beneath brownish with satiny hairs—201. Yagrumo macho, matchwood, *Didymopanax morototoni* (Aubl.) Decne. & Planch.
      EE. Leaflets 3–8, 1½–3½ inches long, slightly notched at rounded apex, beneath gray hairy when young—625. *Didymopanax gleasonii.*

622. Glorybush *Tibouchina granulosa* (Desr.) Cogn.

Flowering twig and fruits (below), natural size.

623. Scheflera, umbrella-tree ***Brassaia actinophylla* Endl.***

This distinctive ornamental has been introduced into Puerto Rico in recent years. It is easily recognized by: (1) several trunks from base, mostly unbranched; (2) the few very large palmately compound leaves with mostly 7–12 oblong or elliptic shiny leaflets slightly drooping in a circle at the end of a very long slender petiole; (3) the large showy terminal flower clusters, consisting of 10–20 widely spreading dark purple axes 1½–2 feet long, suggesting arms of an octopus; (4) the many showy dark red or crimson ball-like flowers ⅜ inch wide, crowded in heads along each axis; and (5) round or top-shaped blackish fruits ¼ inch in diameter.

Small evergreen ornamental tree 20–35 feet high, with several trunks from base 2–8 inches in diameter, unbranched or with few stout branches, and with flattened crown of coarse foliage suggesting an umbrella, hairless throughout. Bark light gray, smoothish or becoming slightly fissured. Twigs few, very stout, ¾–2 inches in diameter, green, with light brown lines (lenticels).

Leaves alternate, palmately compound (digitate), about 2–3 feet long. Petioles very long, 1–2 feet, relatively slender, enlarged at both ends, round, light green. In the angle above the petiole, also forming bud at end of twig is a light green stipule 1½–2 inches long, very narrow and ending in long point, persistent. Leaflets mostly 7–12 (5–18), spreading in circle at end of petiole on slender spokelike stalks 2–4½ inches long. Leaflet blades are mostly 6–12 inches long and 3–5 inches broad, rounded and abruptly short-pointed at apex, rounded or short-pointed at base, slightly turned under at edges, slightly thickened and leathery. The upper surface is shiny dark green with grooved light green midrib and inconspicuous side veins, and the lower surface dull light green with slightly raised veins.

The large terminal flower clusters (panicles) consist of 10–20 widely spreading stout axes. Flowers are borne 10–12 stalkless in rounded heads ¾ inch across on dark purple stalks of ⅜–½ inch along the axis. The top half of the rounded dark red bud nearly ¼ inch in diameter is composed of 10–12 narrow pointed thick petals 3/16 inch long, dark red on outer surface and whitish on inner surface, shedding early as a half-round cap. Other flower parts are of the same number as petals, the calyx represented by a narrow rim with minute teeth. Stamens 10–12, 3/16 inch long, red, with stout filaments and large anthers, erect and slightly spreading ⅜–½ inch across, soon shedding. The half-round pistil, turning from light to dark red, consists of an inferior ovary whitish within and slightly resinous and aromatic, with 10–12 narrow cells each containing 1 ovule, and the same number of dot stigmas in a ring.

In fruit the head is composed of 10–12 berries, each bordered by 4 brownish black scales in form of a cup, which is persistent after shedding. The berry has a ring of stigmas at apex, a ring slightly above middle, also vertical ridges corresponding to the 10–12 cells. Seeds 1 in each cell, elliptic flattened, brown, ⅛ inch long. Flowering and fruiting in summer.

The wood is soft and not durable.

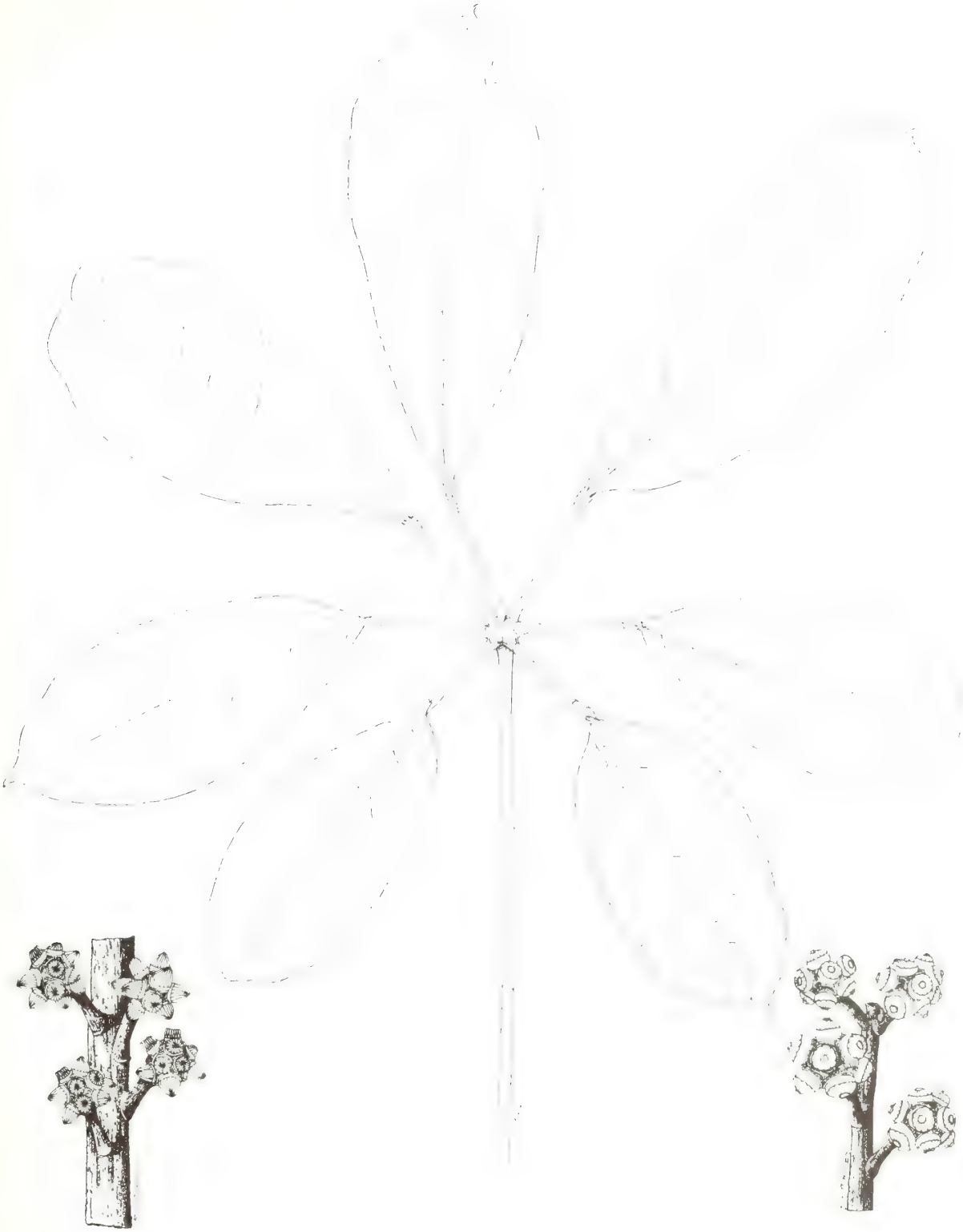
This uncommon ornamental is a relatively recent introduction to Puerto Rico and was not listed by Britton and Wilson (*10*). It is being planted more frequently, especially at edges of buildings, and grows rapidly. Propagated from seeds and cuttings. The plants will grow in poor sand and can be pruned and topped. The berries stain sidewalks.

In southern and central Florida this popular small tree is recommended for tropical effects in confined areas, such as commercial buildings, parking lots, patios, and boxes, as well as around homes. It withstands a few degrees of freezing temperatures and flowers in about 10 years where located in the sun. Northward it is grown indoors as a potted plant for the handsome foliage. Cultivated also in Hawaii. Where native, the seeds sometimes germinate on other trees and send roots down to the ground.

RANGE.—Native of Queensland, Australia. Spread as an ornamental through the tropics and as a potted plant northward in temperate regions.

OTHER COMMON NAMES.—scheflera (Spanish); mano (Dominican Republic); umbrella-tree, Queensland umbrella-tree, schefflera, octopus-tree (English).

BOTANICAL SYNONYM.—*Schefflera actinophylla* (Endl.) Harms.



623. Scheflera, umbrella-tree *Brassaia actinophylla* Endl.*

Leaf, one-third natural size; flowers (lower left), fruits (lower right), two-thirds natural size.

624. Gongolí ***Dendropanax laurifolius*** **(E. March.) R. C. Schneid.**

Gongolí, a species restricted to mountain forests of Puerto Rico, is identified by: (1) dark green obovate to elliptic leaves with unequal, short but mostly long, green leafstalks ½–5 inches long, slender but often slightly enlarged at both ends; (2) branched flower clusters (compound umbels), with many small yellow-green 5-parted flowers ¼ inch across, spreading in rounded masses on stalks of equal length; and (3) many rounded fleshy fruits ¼ inch in diameter, with 5 short styles at apex.

Evergreen small to medium-sized tree to 30 feet high and 6 inches in trunk diameter, reported to reach 65 feet and 10 inches, hairless throughout. Bark on small trunks gray or brown and smooth. Inner bark whitish with a green outer layer, tasteless. Twigs are green when young, becoming gray, with both long and short internodes.

The alternate leaves are mostly grouped near ends of twigs. Blades are 2½–8½ inches long and 1–4½ inches wide, slightly thickened and leathery, short- to long-pointed at apex, short-pointed to rounded at base, edges straight or slightly wavy, the upper surface dark green and dull or slightly shiny, with faint veins, the lower surface shiny green with network of raised veins.

The branched flower clusters (compound umbels), borne at sides and ends of twigs are 2–3 inches across and have spreading stalks about 1 inch long with 3–4 scales near middle. Flowers are male and female on different branches on stalks ⅛–¼ inch long (monoecious). Male flowers have a 5-toothed calyx, 5 yellow-green petals more than $^1/_{16}$ inch long, and 5 alternate stamens. Female flowers have 5-toothed calyx, 5 petals, and pistil with inferior 5-celled ovary and 5 short styles. Fruits (berries) are fleshy, bear at apex the calyx and styles, becoming 5-grooved on drying, 5-seeded. Flowering in spring and maturing fruits from late spring to fall.

The wood is light brown and soft.

Uncommon in lower Luquillo and Cordillera forests at 1,500–3,000 feet altitude. Middle altitudes in mountains of Puerto Rico.

PUBLIC FORESTS.—Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAMES.—palo de cachumba, palo de gangulín, palo de pollo negro, palo de vaca, vibona, víbora (Puerto Rico).

BOTANICAL SYNONYM.—*Gilibertia laurifolia* E. March.

624. Gongolí *Dendropanax laurifolius* (E. March.) R. C. Schneid.

Fruiting twig (left) and flowers (center right), natural size.

625. Yuquilla ***Didymopanax gleasonii*** **Britton & Wilson**

This distinctive small tree of high mountains is easily recognized by its leaves resembling those of tapioca or yuca, from which the common name was derived. Characters for identification include: (1) palmately compound leaves with 3–8 oblong-obovate leaflets spreading at the end of a long leafstalk; (2) many small yellowish green 4–5-parted flowers about ¼ inch wide, spreading from stalks of equal length (compound umbels); and (3) rounded and flattened black berries 5/16 inch long and broad.

Evergreen shrub or small tree commonly to 15 feet high and 3 inches in trunk diameter, rarely to 35 feet tall and 10 inches in diameter. The bark is gray, smoothish to slightly fissured and warty. Inner bark is light brown and slightly bitter. The stout twigs are green, turning brown, with large leaf scars.

The alternate leaves are crowded near ends of twigs. Leafstalks are 2–4 inches long, slender but enlarged at both ends, light green. The leaflets have stalks ¼–½ inch long and blades 1½–3½ inches long and ⅝–1⅛ inches wide, slightly notched at the rounded apex, widest near apex and tapering to long-pointed base, slightly thickened, edges slightly turned under, with inconspicuous side veins, the upper surface shiny green to dark green and hairless, the lower surface dull pale green, densely gray hairy when young but becoming nearly hairless.

Flower clusters (compound umbels) are erect at or near ends of the twigs, 4–9 inches across, consisting of a long main stalk ending in many spreading shorter stalks of nearly equal length, each bearing many flowers on slender hairy stalks ¼–⅜ inch long in a rounded mass (umbel). The flower is composed of minute finely hairy basal tube (hypanthium) enclosing the inferior 2-celled ovary and bearing the minute 4–5-toothed calyx, 4–5 yellowish green petals, 4–5 long spreading stamens, and 2 styles. The fleshy fruits (berries) topped by the 2 styles are finely hairy, green when immature, and bear 2 flattened seeds. Flowering and fruiting in spring and summer.

The wood is light brown, soft, and brittle.

Uncommon in upper Luquillo and upper Cordillera forests, also dwarf forest, at 1,500–4,390 feet altitude in upper mountains of Puerto Rico. Rare in Luquillo Mountains where 2 trees were found. Common on ridges of Cerro de Punta, highest peak of the island, ascending to the summit.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rico.

This species was discovered by Henry A. Gleason, botanist of the New York Botanical Garden, and Melville T. Cook, of the Puerto Rico Agricultural Experiment Station. On March 18, 1926, they made apparently the first ascent by botanists of the highest peak of the island. Their report on the vegetation of Puerto Rico was published the next year (*12, 25*).

626. Gallego, Guilfoyle polyscias ***Polyscias guilfoylei*** **(Bull) L. H. Bailey***

This ornamental shrub or small tree to 20 feet in height and 4 inches in trunk diameter, with few nearly erect branches, is planted for its variegated foliage with leaflets partly whitish green or bordered with white. Distinguishing characters are: (1) narrow shape with erect stem and branches, the stout greenish twigs with raised dots (lenticels); (2) alternate pinnate hairless leaves 12–18 inches long, composed of slender greenish axis with base nearly clasping and 5–9 slender stalked leaflets paired except at end, slightly spicy aromatic when crushed; and (3) elliptic to nearly round leaflets 2–5 inches long and 2–3 inches broad, thin, short-pointed at both ends, and with sharp teeth of 2 sizes along edges, the shiny upper surface with irregular whitish green patches or blotches and sunken veins, and the lower surface shiny yellow green. The small flowers, seldom produced, are long-stalked in large long-stalked branching clusters. Several cultivated varieties differ in shape, size, and markings of leaflets, including cut-leaf forms. The plants are readily propagated from cuttings and often trimmed into hedges.

RANGE.—Native of South Sea Islands but widely planted in the tropics north to southern Florida. Also grown in pots indoors northward. Known also as wild-coffee and coffee-tree but not related to that plant.

OTHER COMMON NAMES.—panax (Virgin Islands); gallego (Dominican Republic); lluvia de plata (El Salvador); paresseux (Haiti); frosted angelica (Dutch Antilles).

625. Yuquilla *Didymopanax gleasonii* Britton & Wils.

Two-thirds natural size.

HEATH FAMILY (ERICACEAE)

Shrubs sometimes small, epiphytes, and trees generally small, known by: (1) leaves usually alternate, simple, elliptic, and entire, often thick and evergreen, without stipules; (2) flowers small or large and showy, bisexual, regular or slightly irregular, with calyx 4–7-lobed and generally persistent, corolla of 4–7 lobes or petals, often bell- or funnel-shaped, 8–10 stamens from a disk, and pistil with superior or inferior ovary of usually 5 cells and many ovules and style; and (3) fruit a capsule, berry, or drupe.

627. *Lyonia rubiginosa* (Pers.) G. Don

The only tree species of the heath family native in Puerto Rico and the Virgin Islands is this rare shrub or small tree of mountain forests. It is identified by: (1) elliptic leaves 1¼–2½ inches long and ½–1¼ inches wide, slightly thickened and leathery, the upper surface shiny green with midvein sunken and edges slightly turned under; (2) small flowers ¼ inch long with whitish urn-shaped corolla, 5-toothed at the narrow apex, several on slender stalks at leaf bases; and (3) elliptic seed capsules 3/16 inch long, brown, 5-angled, splitting into 5 parts.

Evergreen shrub or small tree to 20 feet high and 1 foot in trunk diameter. Bark gray to brown, finely fissured and slightly shreddy, the inner bark dark brown and tasteless. The twigs are light green and angled and with dotlike scales when young, becoming reddish brown, with slightly raised leaf scars. End and side buds are elliptic, 1/16 inch long, light green to light brown.

The alternate leaves have light green leafstalks ⅛–⅜ inch long. Blades are blunt or short-pointed at apex, short-pointed at base, with inconspicuous side veins, the lower surface dull light green, with many minute rusty or gray dotlike scales when young.

Several flowers are borne spreading at base of a leaf on slender stalks about ¼ inch long. The flower, with parts bearing minute dotlike scales, is composed of short 5-lobed calyx, whitish urn-shaped corolla with 5 teeth at narrowed apex, 5 stamens, and pistil with 5-angled hairy ovary and slender style. The finely hairy seed capsules persist on twigs with calyx remaining at base and often the style at apex. There are many very small, narrow seeds. Flowering and fruiting irregularly from spring to fall.

The wood is light yellow.

Rare and local in dwarf forest and Cordillera at 1,800–4,390 feet altitude in mountains of Puerto Rico. In the dwarf forest on summit of Cerro de Punta, the highest peak, and the summit of Pico Guilarte. Collected at 1,800 feet in mountains southeast of Lares. Also at 1,000 feet at Bolongo, St. Thomas.

PUBLIC FORESTS.—Guilarte, Toro Negro.

RANGE.—Known only from St. Thomas and Puerto Rico.

BOTANICAL SYNONYMS.—*Xolisma rubiginosa* (Pers.) Small, *X. stahlii* (Urban) Small, *Lyonia stahlii* Urban.

This species long known only from St. Thomas was found in 1926 at Cerro de Punta. *Lyonia stahlii* Urban, a shrub described from mountains near Bayamón, apparently is not specifically distinct.

627. *Lyonia rubiginosa* (Pers.) G. Don

Flowering twig (upper left), fruiting twig (lower right), natural size.

THEOPHRASTA FAMILY (THEOPHRASTACEAE)

Shrubs and trees mostly small, known by: (1) leaves generally alternate simple, without stipules; (2) flowers small, bisexual or unisexual (dioecious), regular, with 5 sepals, corolla 5-lobed and yellow or orange, 5 stamens opposite the lobes and 5 staminodes or teeth, and pistil with superior 1-celled ovary containing many ovules on central placenta; and (3) fruit a yellow berry or drupe with many to few seeds.

Key to species

A. Leaves small, ½–1¼ inches long; flowers few on stalks curved down at leaf bases, with light yellow corolla—629. *Jacquinia berterii.*

AA. Leaves larger, more than 1¼ inches long; flowers several to many on erect stalks in terminal clusters, with white corolla.

B. Leaves with short-pointed base of blade and very short petiole 1/16 inch long—630. *Jacquinia revoluta.*

BB. Leaves with gradually narrowed long-pointed base of blade and petiole ⅛–¼ inch long—628. *Jacquinia arborea.*

628. Barbasco — *Jacquinia arborea* Vahl

This shrub or small tree common along the coasts is easily recognized by; (1) the dull yellow-green spoon-shaped (spatulate) leaves, which are thick, stiff, and slightly fleshy, with edges much turned under; (2) twigs much forking, stout, whitish gray, covered with minute mealy scales; (3) many small white bell-shaped 5-parted flowers ¼ inch long and broad on erect stalks in terminal clusters; and (4) many orange-red, round berries about 5/16 inch in diameter and pointed at end, probably poisonous.

Generally a shrub but sometimes a small tree to 15 feet high and 6 inches in trunk diameter, with evergreen, compact, much branched rounded crown. The bark is smoothish or finely fissured and dark brown, and the light brown or yellowish inner bark is bitter.

The leaves are mostly in clusters of 3 or more together near ends of twigs but partly alternate. Leafstalks are ⅛–¼ inch long, yellowish and minutely scaly. Leaf blades are 1½–3½ inches long and ⅝–1¾ inches broad, widest near the rounded or slightly notched apex and gradually narrowed toward the long-pointed base, hairless but with many tiny gland dots on both sides, paler beneath.

Many fragrant flowers are borne in terminal clusters (racemes) 2–4 inches long on stout erect scaly stalks ⅜–¾ inch long, which are thickened toward apex. There are 5 overlapping rounded green sepals about ⅛ inch long, hairless, remaining at base of fruit; the white corolla ¼ inch long is tubular and bell-shaped with 5 rounded spreading lobes; 5 stamens on base of corolla tube opposite the lobes and alternating with 5 petallike sterile stamens (staminodes); and pistil with 1-celled ovary and short style.

The berries are sometimes so numerous that the clusters are curved downward from their weight. Each has a thin shell and 1–4 rounded brown seeds 3/16 inch long in the bitter and probably poisonous, orange-red pulp. Flowering from winter to summer and maturing fruits from spring to fall.

The hard wood is light brown or yellowish.

This species has possibilities as an ornamental, because of its compact yellow-green foliage, fragrant white flowers, and yellow fruits. Crushed fruits of this and related species have been used to poison or stupefy fish.

Common in dry and moist coastal forests from sea level to 300 feet altitude along all coasts of Puerto Rico. Also along coasts of the islands nearby, including Mona, Icacos, Palominos, Piñeros, Vieques, and Culebra, and in St. Croix, St. Thomas, St. John, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Boquerón, Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, throughout Lesser Antilles from St. Martin to Grenada, Barbados, and Tobago.

OTHER COMMON NAMES.—azúcares (Puerto Rico); barbasco (Spanish); torchwood, piecrust, pica (Barbados); picrous-bark, mata piskaa, paaloe hoekoe, sjiengool, steenhout (Dutch West Indies).

Formerly referred to *Jacquinia barbasco* (Loefl.) Mez, a species described from Venezuela.

The generic name, originally spelled *Jaquinia,* honors Nicholas Joseph von Jacquin (1727–1817), Austrian professor who collected, named, and painted many West Indian plants.

628. Barbasco *Jacquinia arborea* Vahl

Flowering twig (above), fruiting twig (lower right), natural size.

629. ***Jacquinia berterii* Spreng.**

This shrub or small tree of dry and moist coastal forests is recognized by: (1) small spoon-shaped dull yellow-green thickened leaves in whorls or sometimes opposite; (2) small light yellow 5-parted flowers 3/16 inch long and broad, on stalks curved down at leaf bases; and (3) egg-shaped or rounded orange or yellow fruit 1/4 inch in diameter, probably poisonous.

Evergreen shrub or a small tree 20 feet high, recorded to 25 feet, and 6 inches in trunk diameter, much branched and spreading. Bark dark gray to blackish, smooth to finely fissured, the inner bark light yellow and bitter. Twigs are light brown, covered with scale hairs, ending in minute bud.

The leaves are crowded, mostly 3 or more at a node or whorled, also paired or opposite, without stipules, almost stalkless, the leafstalk about 1/16 inch long. The blades are mostly spoon-shaped (spatulate), 1/2–1 1/4 inches long and 1/4–1/2 inch wide, varying in shape from narrow to broad, rounded or slightly notched at apex, gradually tapering to long-pointed base, thick and stiff with edges slightly curved down, without visible midvein or veins, hairless, with minute dots and dull yellow green on both surfaces.

One to several fragrant flowers are borne at leaf bases on slender stalks less than 1/4 inch long and enlarged at apex, nodding or curved down. The flower is composed of calyx with 5 rounded overlapping lobes; light yellow bell-shaped waxy corolla with 5 rounded spreading lobes; 5 short stamens on base of corolla and opposite the lobes; and pistil with 1-celled ovary containing many ovules, tapering style, and dotlike stigma. The berrylike fruit is pointed at apex, hard-walled, and many-seeded. Flowering and fruiting in summer.

The wood is light brown and hard.

Uncommon and scattered in dry and moist coastal forests from sea level to 200 feet altitude on eastern and southern coasts of Puerto Rico. Also in Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Peter Island, Virgin Gorda, and Anegada.

PUBLIC FOREST AND PARK.—Guánica; Virgin Islands.

RANGE.—Bahamas, Cuba, Hispaniola, Puerto Rico and Virgin Islands, Anguilla, St. Martin, and Guadeloupe.

OTHER COMMON NAMES.—espuela de caballero de pinar (Cuba); bois bandé, bois cassava (Haiti).

This species honors Carlo Guiseppe Bertero (1789–1831), Italian scientist, who made a collection of plants in Puerto Rico in 1818.

630. Barbasco ***Jacquinia revoluta* Jacq.**

A rare shrub or small tree to 20 feet high and 3 inches in trunk diameter, collected on Tortola. It is characterized by: (1) slender twigs with fine scale hairs; (2) leaves obovate, 1 1/4–2 1/4 inches long, leathery with scale dots, the apex rounded, notched, or minutely pointed, the base short-pointed, veins faint, petioles very short, about 1/16 inch; (3) fragrant flowers about 1/4 inch long with 5 rounded sepals hairy on edges and 5-lobed white corolla, few to several in terminal clusters; and (4) orange round fruit about 1/4 inch in diameter. Rare on upper slopes of Sage Mountain, Tortola, not found in recent years.

RANGE.—Tortola and Lesser Antilles from St. Martin to Trinidad, also in Venezuela and Colombia.

629. *Jacquinia berterii* Spreng.

Flowering twig (above), fruiting twig (below), natural size.

MYRSINE FAMILY (MYRSINACEAE)

Shrubs and small trees, rarely large, known by: (1) leaves mostly alternate, simple, thickened, with gland dots and lines, without stipules; (2) flowers small, often crowded and many, bisexual or sometimes unisexual (dioecious), regular, with calyx of 4–5 sepals or lobes and persistent, corolla of 4–5 spreading lobes mostly white or pink and with gland dots, 4–5 stamens inserted on the corolla opposite the lobes, and pistil with superior 1-celled ovary of 1 to several ovules and style; and (3) fruit a small rounded drupe, black or purplish, with 1 to few seeds. Also vol. 1, p. 430.

Key to species

A. Flowers and fruits many in almost stalkless clusters along twigs mostly back of leaves—*Rapanea.*
  B. Twigs rusty-brown hairy; leaves slightly hairy beneath, lance-shaped, short-pointed—203. Mantequero, *Rapanea coriacea* (Sw.) Mez (*R. ferruginea*).
  BB. Twigs hairless; leaves hairless, elliptic, rounded or blunt-pointed—204. Bádula, Guiana rapanea, *Rapanea guianensis* Aubl.
AA. Flowers and fruits in stalked clusters.
  C. Flowers many in terminal erect much-branched clusters (panicles).
    D. Leaves thin, mostly finely wavy-toothed on edges, long-pointed at apex—635. *Parathesis crenulata.*
    DD. Leaves thick and leathery with edges turned under, blunt-pointed at apex—*Ardisia.*
      E. Leaves 4–10 inches long, thick and succulent, with edges turned under; flowers nearly ½ inch across—631. *Ardisia glauciflora.*
      EE. Leaves mostly smaller, slightly thick and succulent, with edges slightly turned under.
        F. Leaves 2½–5½ inches long; flower clusters 3–5 inches long and broad, flowers ⅜ inch across—202. Mameyuelo, *Ardisia obovata* Desv.
        FF. Leaves 2–3 inches long; flower clusters 2–3 inches long and broad, flowers 5/16 inch across—632. *Ardisia luquillensis.*
  CC. Flowers in unbranched clusters.
    G. Leaves obovate, 3–10 inches long, crowded at ends of stout twigs; flowers short stalked along very slender drooping axis (raceme)—634. *Wallenia pendula.*
    GG. Leaves obovate to oblanceolate, 1–2½ inches long, crowded near ends of short side twigs; flowers several in slender stalked clusters at leaf bases—633. *Grammadenia sintenisii.*

631. Mameyuelo — *Ardisia glauciflora* Urban

A small tree known only from mountains of eastern Puerto Rico, recognized by: (1) elliptic leaves 4–10 inches long and 2–4½ inches wide, mostly large, thick and leathery and with edges turned under; (2) terminal much branched flower clusters bearing very many spreading 5-parted slightly succulent flowers nearly ½ inch across; and (3) many crowded round berry fruits about ¼ inch in diameter.

A small evergreen tree recorded to 26 feet high and 4 inches in trunk diameter, with crown of few stout branches. The bark is gray and smooth, the inner bark pink and tasteless. Twigs few, stout, dark brown, finely hairy.

Leaves alternate, with short stout petioles less than ⅜ inch long, hairless. Blades are blunt at both ends, with prominent network of veins when dry, with minute gland dots, green and slightly shiny on upper surface, and pale green beneath.

The flower clusters (panicles) 3–6 inches wide bear very many flowers, the branches brown and finely hairy, the flower stalks less than ¼ inch long. The calyx is composed of 5 rounded sepals 3/16 inch long, covered with black dots and with minute hairs on edges; the corolla with short tube ⅛ inch long and 5 narrow spreading lobes 3/16 inch long, gray with black dots; stamens 5, inserted on corolla tube and opposite the lobes; and pistil with conical 1-celled ovary and slender style. Flowering and fruiting in spring and summer.

The wood is whitish to light brown, hard, and heavy. It has been used locally for furniture.

Uncommon in lower Luquillo and Cordillera forests to 1,500 feet altitude in mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAME.—ausobón (Puerto Rico).

BOTANICAL SYNONYM.—*Icacorea glauciflora* (Urban) Britton.

631. Mameyuelo *Ardisia glauciflora* Urban

Fruiting twig (above), flowers (lower right), two-thirds natural size.

632. Mameyuelo ***Ardisia luquillensis*** **(Britton) Alain**

This rare small tree known only from Luquillo Mountains is distinguished by: (1) obovate leaves 2–3½ inches long and ⅞–1½ inches wide, slightly thick and succulent and turned under at edges, with minute gland dots; (2) erect terminal, much branched flower clusters with very small flowers 5/16 inch across, pale green tinged with pink; and (3) many round 1-seeded fruits ¼–5/16 inch in diameter, black and slightly fleshy.

A small evergreen tree to 15 feet high and 4 inches in trunk diameter, hairless. Bark gray or brown, smoothish to slightly fissured, covered with mosses, the inner bark light brown or pink and bitter. Twigs are brown and slightly angled.

The alternate leaves are blunt-pointed at apex, broadest beyond middle, and narrowed into long-pointed base and petiole less than ¼ inch long. The upper surface is green to dark green, slightly shiny, with yellowish midvein and side veins indistinct, and the lower surface dull light green.

The flower clusters (panicles) 2–3 inches long and broad bear very many crowded short-stalked flowers at the ends of reddish branches. The calyx is composed of 5 rounded gland-dotted lobes 1/16 inch long; corolla has short tube and 5 spreading gland-dotted lobes more than ⅛ inch long; 5 stamens inserted near base of corolla tube and opposite the lobes; and pistil with elliptic 1-celled ovary and short style. The gland-dotted berries have short point of style at apex, calyx at base, change color from green to red to black at maturity, and contain 1 large round seed. Collected with flowers and fruits in August and with immature fruits in March.

The wood is light brown and hard.

Rare in dwarf forest at about 3,000–3,400 feet altitude on summits of peaks of Luquillo Mountains.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from eastern Puerto Rico.

BOTANICAL SYNONYM.—*Icacorea luquillensis* Britton.

This species was first found in 1923 and named in 1925 but was incompletely known until flowers were collected by the Forest Service in 1940.

632. Mameyuelo *Ardisia luquillensis* (Britton) Alain

Fruiting twig (left), flowering twig (upper right), natural size.

633. ***Grammadenia sintenisii*** **(Urban) Mez**

Shrub or small tree of dwarf forest at high altitudes in Luquillo Mountains characterized by: (1) obovate to oblanceolate leaves crowded near ends of short side twigs; (2) small whitish or greenish yellow 5-parted flowers 1/4 inch across, several in clusters at leaf bases; and (3) elliptic berrylike fruit 5/16 inch long, with minute point at apex, 1-seeded.

Evergreen shrub 10 feet or less in height, sometimes a small tree to 15 feet high and 4 inches in trunk diameter, hairless throughout. Bark smooth, gray, the inner bark brown and slightly bitter. Twigs brownish green, both slender and stout, becoming light brown. Buds of minute pointed young leaves without scales or stipules.

Leaves alternate along main twigs and crowded at enlarged ends of slender side twigs. Leafstalks 1/8–1/4 inch long. Blades obovate to oblanceolate, 1–2 1/2 inches long, 1/2–3/4 inch wide, thick, stiff, and slightly succulent, with minute gland dots visible with lens. The apex is blunt-pointed, the base long tapering, the border slightly turned under, the upper surface green to dark green and slightly shiny, the sides bent up from the sunken midvein and without visible veins, the lower surface dull light green.

Flower clusters (like umbels) at base of leaves bear at the end of a slender stalk about 3/4 inch long several flowers on slender stalks each about 1/2 inch. Flowers bisexual and male, composed of light green calyx with 5 narrow pointed lobes, greenish yellow or whitish corolla of 5 rounded spreading lobes, 5 minute stamens borne near base of corolla and opposite the lobes; and minute pistil with rounded 1-celled ovary containing 3–4 ovules and very short style. Flowering continuously.

Known only from dwarf forest at altitudes of 2,500–3,500 feet in Luquillo Mountains of eastern Puerto Rico.

PUBLIC FOREST.—Luquillo.

RANGE.—Eastern Puerto Rico.

This species commemorates its discoverer, P. Sintenis, who made large collections of plants in Puerto Rico in 1884–1887, including the first at El Yunque.

633. *Grammadenia sintenisii* (Urban) Mez

Flowering twig, natural size.

634. Rascagarganta ***Parathesis crenulata*** **(Vent.) Hook. f.**

This shrub, rarely small tree, of moist forests in Puerto Rico, is identified by: (1) oblanceolate or narrowly elliptic thin leaves, long-pointed at both ends, with finely wavy-toothed or straight edges, with minute gland dots visible with a lens against the light; (2) many small pink flowers $\frac{1}{4}$–$\frac{5}{16}$ inch across in terminal branched clusters; and (3) many black round fleshy fruits $\frac{1}{4}$–$\frac{5}{16}$ inch in diameter, 1-seeded.

An evergreen shrub or rarely small tree to 18 feet high and 3 inches in trunk diameter. The young twigs are densely covered with minute brownish hairs and scales.

The alternate leaves have blades 3–6 inches long and $\frac{3}{4}$–$1\frac{3}{4}$ inches wide, the base tapering into the slightly winged slender petiole $\frac{3}{8}$–$\frac{3}{4}$ inch long. The upper surface is shiny green and hairless, and the lower surface dull and paler with minute hairs or nearly hairless.

Flower clusters (panicles) are terminal and 2–4 inches long, the slender branches covered with minute hairs and scales. The finely hairy flowers on stalks of $\frac{1}{8}$ inch or less are composed of calyx with 5 narrow pointed lobes, pink corolla $\frac{3}{16}$ inch long with 5 narrow pointed lobes, 5 stamens at base of lobes and opposite them, and pistil with conic ovary and long threadlike style. The berries have calyx at base and pointed base of style at apex and are covered with minute gland dots. The round seed is $\frac{1}{8}$ inch in diameter. Collected with flowers from May to July and with fruits from July to December.

Uncommon in moist forests from sea level to 2,500 feet altitude in Puerto Rico.

RANGE.—Puerto Rico, Hispaniola, and Cuba.

OTHER COMMON NAMES. — secagarganta (Puerto Rico); jalapón (Dominican Republic); raisin marron (Haiti).

BOTANICAL SYNONYM.—*Ardisia crenulata* Vent.

This species was included by Britton and Wilson (*10;* 6: 58) under *Parathesis serrulata* (Sw.) Mez. That species of Cuba and Hispaniola is separated by the twigs with dark red hairs, mostly smaller leaves $2\frac{1}{2}$–4 inches long, slightly thickened and with star-shaped hairs beneath, and by slightly smaller flowers less than $\frac{1}{4}$ inch across.

634. Rascagarganta *Parathesis crenulata* (Vent.) Hook. f.

Fruiting twig (above), flowering twig (below), two-thirds natural size.

635. Jacanillo ***Wallenia pendula*** **(Urban) Mez**

A shrub or sometimes small tree known only from high mountains of Puerto Rico. Distinguishing characters are: (1) obovate leaves 3–10 inches long and 1¼–3 inches wide, slightly thickened and leathery, mostly clustered at ends of stout twigs; (2) flower clusters consisting of a very slender drooping axis and many short-stalked greenish white flowers about ¼ inch long, male and female on different trees (dioecious); and (3) rounded reddish berries less than ¼ inch in diameter, 1-seeded.

An evergreen shrub 6–10 feet high or small tree to 20 feet high and 3 inches in trunk diameter, recorded as sometimes to 33 feet. Twigs gray or brownish gray, stout, hairless.

The leaves are alternate but clustered at ends of twigs, which have some long internodes. Petioles ⅜–1 inch long. Blades are short-pointed or blunt at apex, broadest beyond middle, and gradually narrowed to short-pointed or blunt base, with straight or slightly wavy edges, with prominent network of fine veins, hairless, paler beneath, and with minute gland dots visible against the light with a lens.

Flower clusters (racemes) are unbranched, 5–8 inches long. Male flowers have stalks about 1/16 inch long; calyx of 5 blunt sepals more than 1/16 inch long; corolla tubular, 3/16 inch long, with 5 rounded lobes; 5 slender stamens nearly twice as long as corolla and opposite the lobes; and small sterile pistil. Female flowers have calyx, corolla, stamens, and pistil with round ovary, 2 ovules, and narrow style. The berries are slightly broader than long, have calyx at base and slender point at apex. Flowering and fruiting irregularly over the year.

Rare in dwarf forest and upper mountain forests at 2,000–3,500 feet altitude in high mountains through Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAME.—quiebrahacha (Puerto Rico).

BOTANICAL SYNONYM.—*Petesioides pendulum* (Urban) Britton.

SAPODILLA FAMILY (SAPOTACEAE)

Trees and few shrubs, known by: (1) white latex or milky sap; (2) leaves alternate simple, generally entire, thickened, usually without stipules; (3) flowers small, generally white, green, or light brown, crowded or single at base of leaves or below at nodes, bisexual, regular, with hairy calyx of 4–8 overlapping lobes, corolla with short tube and 4–8 short lobes, stamens very short, generally 4–8 (to many) inserted on corolla opposite the lobes, often with staminodes alternate, and pistil with superior ovary containing generally 4–5 (1–14) cells each with 1 ovule and with short style; and (4) fruit a berry with 1 to few large elliptic shiny seeds with large scar and milky pulp (sometimes edible). Also vol. 1, p. 436.

Key to species

A. Leaves less than 2½ inches long, obovate, rounded at apex.
  B. Leaves with few long fine side veins nearly parallel with edges—*Bumelia.*
    C. Leaves ¼–⅝ inch long; many short twigs as sharp slender spines—636. *Bumelia krugii.*
    CC. Leaves ¾–1½ inches long; not spiny—637. *Bumelia obovata.*
  BB. Leaves ¾–1½ inches long, with several short side veins—641. *Dipholis cubensis.*
AA. Leaves larger.
  D. Leaves with many straight parallel side veins nearly at right angle to midvein.
    E. Leaves with side veins very close together and indistinct.
      F. Leaves less than 3½ inches long; fruits elliptic, ¾–1¾ inches long—*Micropholis.*
        G. Leaves abruptly short-pointed; the lower surface reddish brown, finely silky hairy—211. Caimitillo, *Micropholis chrysopylloides* Pierre.
        GG. Leaves rounded or slightly notched at apex, green on both surfaces, becoming hairless or nearly so—212. Caimitillo verde, *Micropholis garciniifolia* Pierre.
      FF. Leaves 3–4½ inches long, short-pointed, very shiny; fruits 1½–3 inches in diameter (sapodilla)—210. Níspero, sapodilla, *Manilkara zapota* (L.) v. Royen.*
    EE. Leaves with side veins less close, distinct, mostly larger.
      H. Leaves thin, elliptic, short-pointed at both ends, mostly silky hairy beneath, less than 5 inches long—*Chrysophyllum.*
        I. Leaves with lower surfaces reddish brown or golden silky.
          J. Fruit round, several-seeded, 2–3 inches in diameter from 6–11-celled ovary (star-apple)—206. Caimito, star-apple, *Chrysophyllum cainito* L.
          JJ. Fruit oblong or elliptic, mostly 1-seeded, less than 1¼ inches long.
            K. Fruit oblong, ¾–1¼ inches long, from 5–9-celled ovary—638. *Chrysophyllum bicolor.*
            KK. Fruit elliptic, ¾ inch long, from 5-celled ovary—207. Caimitillo de perro, satinleaf, *Chrysophyllum oliviforme* L.

635. Jacanillo *Wallenia pendula* (Urban) Mez

Fruiting twig (left), flowers (lower right), natural size.

II. Leaves with lower surface finely hairy or becoming nearly hairless.
L. Leaves with lower surface grayish or silvery green and often silky hairy; fruit elliptic or rounded, dark blue, ⅜–¾ inch long, from 6–8-celled ovary—205. Lechecillo, *Chrysophyllum argenteum* Jacq.
LL. Leaves with lower surface becoming nearly hairless; fruit oblong, ½–¾ inch long, sharp-pointed, from 5-celled ovary—639. *Chrysophyllum pauciflorum.*
HH. Leaves thick and leathery, mostly elliptic, shiny, hairless—*Manilkara.*
M. Leaves often large, to 8 inches or more in length; fruits rounded, more than 1 inch in diameter.
N. Leaves elliptic, widest near middle; fruits round or elliptic, 1–1¼ inches long, edible —209. Ausubo, balata, *Manilkara bidentata* (A. DC.) Chev.
NN. Leaves oblong to obovate, mostly widest beyond middle, often crowded at end of long internode; fruits rounded but flattened, 2 inches in diameter—644. *Manilkara pleeana.*
MM. Leaves smaller, elliptic or oblong.
O. Leaves slightly notched or rounded at apex; fruit ¾–1¼ inches in diameter, slightly flattened—643. *Manilkara jaimiqui.*
OO. Leaves rounded at apex; fruit round, ½–⅝ inch in diameter—642. *Manilkara albescens.*
DD. Leaves with several side veins at acute angle to midrib, mostly curved at end.
P. Leaves widest beyond middle.
Q. Leaves large, to 14 inches or more in length, mostly short-pointed at apex; fruits large, edible.
R. Leaves oblanceolate or narrowly obovate; fruits egg-shaped, about 4 inches long, brown (sapote)—647. *Pouteria sapota.**
RR. Leaves narrowly elliptic; fruits round or elliptic, 1½–2 inches long, orange colored—213. Jácana, *Pouteria multiflora* (A. DC.) Eyma.
QQ. Leaves 3–6 inches long, broadly obovate, rounded at apex, fruits rounded at apex; fruits round, 1¼–2¼ inches in diameter, brown, warty—646. *Pouteria hotteana.*
PP. Leaves widest at or below middle.
S. Leaves mostly elliptic, petioles mostly long, slender, ½–1¼ inches long.
T. Leaves blunt, rounded, or slightly notched at apex, with yellow midrib and yellow-green petiole—214. Tortugo amarillo, false-mastic, *Sideroxylon foetidissimum* Jacq.
TT. Leaves short-pointed at apex—640. *Dipholis bellonis.*
SS. Leaves mostly lanceolate, petioles short, mostly less than ½ inch long.
U. Leaves with long whitish hairs beneath, short-pointed or blunt at apex—645. *Pouteria dictyoneura.*
UU. Leaves hairless, long-pointed at apex—208. Sanguinaria, wild mespel, willow bustic, *Dipholis salicifolia* (L.) A. DC.

636. Araña gato — *Bumelia krugii* Pierre

Known only from dry areas of southwestern Puerto Rico and Vieques, this spiny shrub or small tree is identified by: (1) twigs much branched, many short twigs ¼–½ inch long modified as sharp slender gray spines extending straight at right angle; (2) very small, obovate to nearly round leaves ¼–⅝ inch long and ⅛–⅜ inch wide, with few long fine side veins nearly parallel with edges, slightly thick and stiff; (3) small light yellow or whitish fragrant flowers ⅛ inch long clustered at leaf bases on very short stalks; and (4) rounded fruits ¼ inch in diameter, green turning dark red, containing 1 large seed.

An evergreen shrub 10 feet high or a small tree to 20 feet high and 6 inches in trunk diameter, much branched. The bark is gray, rough, furrowed into thick plates, the inner bark light brown and bitter. Twigs are slender, much branched, finely rusty-brown hairy when young. Spines arise as short twigs 1 at a node above a leaf, while long spines bear leaves on sides.

The leaves are alternate or sometimes clustered at nodes on very short petioles less than 1/16 inch long. The blades are broadest near the rounded apex, taper to short-pointed base, not toothed on edges, minutely hairy or nearly hairless, green above and light green beneath.

Several flowers are borne in a cluster ¼ inch across at the base of a leaf on brown hairy stalks 1/16 inch long. The calyx about 1/16 inch long has 5 hairy overlapping sepals; the light yellow or whitish corolla ⅛ inch long has a short tube and 5 lobes with 2 small projections at each notch; 5 short stamens inserted near base of tube opposite the lobes and 5 sterile stamens (staminodes); and pistil with round hairy 5-celled ovary and slender style.

The berries are borne singly on stalks 1/16 inch long, have calyx at base and narrow point from style at apex, are slightly longer than broad, and change color from green to dark red at maturity. Inside the thin pulp is 1 large rounded shiny light brown seed. Collected with flowers from January to March and with fruits in May and July.

The wood is light brown and hard.

Rare and local in dry limestone and lower Cordillera forests of southwestern Puerto Rico

636. Araña gato

Bumelia krugii Pierre

Flowering twig (above), fruiting twig (below), natural size.

from sea level to 300 feet altitude. Also in Desecheo and Vieques.

PUBLIC FORESTS.—Guánica, Susúa.

RANGE.—Known only from Puerto Rico, Desecheo, and Vieques.

OTHER COMMON NAME.—peine (Puerto Rico).

BOTANICAL SYNONYM.—*Bumelia obovata* (Lam.) A. DC. var. *krugii* (Pierre) Cronq.

This species is closely related to No. 637, lechecillo, *Bumelia obovata* (Lam.) A. DC., and has been regarded as a variety. That species differs in absence of spines, much larger leaves, longer flower stalks, and slightly larger fruits.

637. Araña gato ***Bumelia obovata* (Lam.) A. DC.**

A shrub or small tree common and widespread in dry areas of southern Puerto Rico and other islands. Distinguishing characters are: (1) obovate or rounded leaves $\frac{3}{4}$–$1\frac{1}{2}$ inches long and $\frac{3}{8}$–$1\frac{1}{4}$ inches wide, with few long fine side veins nearly parallel with edges, slightly thick and leathery; (3) small whitish flowers $\frac{1}{8}$ inch long, few at leaf bases on very slender stalks about $\frac{1}{4}$ inch long; and (4) rounded fruits $\frac{5}{16}$ inch in diameter, green turning dark brown or black, containing 1 seed.

An evergreen small to medium-sized tree to 40 feet high and 1 foot in trunk diameter, sometimes larger, with dense compact crown. The bark is gray, thick, becoming fissured or furrowed and slightly rough. Inner bark is light brown and slightly bitter. The twigs are gray, slender, with minute pressed brown hairs when young.

The alternate leaves have short petioles $\frac{1}{8}$–$\frac{3}{16}$ inch long. Blades are rounded, blunt, or notched at apex, long-pointed to blunt at base, slightly turned under at edges, hairless, when dry with many fine lines parallel to side veins, green and slightly shiny on both surfaces.

The flowers are composed of calyx about $\frac{1}{16}$ inch long with 5 hairy overlapping sepals; whitish corolla $\frac{1}{8}$ inch long with short tube and 5 lobes with 2 small projections at each notch; 5 short stamens inserted near base of tube opposite the lobes and 5 sterile stamens (staminodes); and pistil with round hairy 5-celled ovary and slender style. The berries are borne singly at leaf bases, slightly longer than broad, and have calyx and threadlike style persistent. The large rounded seed is shiny brown. Flowering and fruiting probably irregularly through the year.

The wood is light brown and hard.

Uncommon but widely distributed at low altitudes in dry limestone forest and dry coastal hills and beaches to 800 feet altitude in southern and southwestern Puerto Rico. Also Mona, Desecheo, Muertos, Culebra, Vieques, St. Croix, Buck Island, St. Thomas, St. John, Jost Van Dyke, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Guánica, Susúa; Buck Island Reef, Virgin Islands.

RANGE.—Jamaica, Hispaniola, Puerto Rico and Virgin Islands, and through Lesser Antilles from St. Martin and Saba to St. Lucia and Bequia. Also in Bonaire, Curacao, Aruba, and northern Venezuela.

OTHER COMMON NAMES.—lechecillo, quiebrahacha (Puerto Rico); breakbill (Virgin Islands); pintop (Tortola); placa chiquitu, palu di lechi, palu di pluta, rambéshi (Dutch Antilles).

Insect galls rounded and about $\frac{1}{8}$ inch in diameter sometimes are present on scattered leaves and may aid identification.

637. Araña gato *Bumelia obovata* (Lam.) A. DC.

Twig with flowers and immature fruits (left), fruiting twig (right), natural size.

638. Caimitillo, wild cainit ***Chrysophyllum bicolor* Poir.**

Caimitillo is characterized by: (1) twigs golden or reddish brown silky hairy, with milky sap; (2) elliptic leaves dark green on upper surface and golden or brown silky hairy beneath; (3) several light green bell-shaped flowers $\frac{3}{16}$ inch long at leaf bases; and (4) oblong or rounded berries $\frac{3}{4}$–$1\frac{1}{4}$ inches long, usually 1-seeded.

An evergreen tree recorded as 25–50 feet high and 1 foot in trunk diameter, with milky sap.

The alternate leaves have petioles $\frac{1}{4}$–$\frac{1}{2}$ inch long. Blades are 2–5 inches long, 1–$2\frac{1}{4}$ inches wide, abruptly long-pointed at apex, blunt or rounded at base, not toothed on edges, thin, the upper surface dark green, and the lower surface golden or reddish brown silky hairy or becoming nearly hairless.

Several flowers are borne on slender reddish-brown hairy stalks $\frac{1}{4}$–$\frac{1}{2}$ inch long at base of a leaf. There are usually 5 overlapping reddish-brown hairy sepals $\frac{1}{16}$ inch long; the bell-shaped light green hairy corolla $\frac{3}{16}$ inch long has 5 spreading lobes mostly shorter than the tube; stamens 5 on corolla tube opposite the lobes; and pistil with hairy round 5–9-celled ovary, short style, and 5–9 stigmas. The fruits have 1 seed, sometimes 2 or more. Flowering and fruiting from spring to fall.

The trees have been cultivated for the edible fruits.

Rare at sea level in lowland forests near Loíza Aldea, Puerto Rico. Also in St. Croix, St. Thomas, and St. John.

PUBLIC PARK.—Virgin Islands.

RANGE.—Hispaniola and Puerto Rico and Virgin Islands.

OTHER COMMON NAMES.—lechecillo, caimito cimarrón (Puerto Rico); wild cainit (Virgin Islands); caimito cimarrón (Dominican Republic).

BOTANICAL SYNONYMS.—*Chrysophyllum eggersii* Pierre; *Cynodendron bicolor* (Poir.) Baehni.

638. Caimitillo, wild cainit

Chrysophyllum bicolor Poir.

Flowering twig, natural size.

639. Caimito de perro ***Chrysophyllum pauciflorum* Lam.**

Caimito de perro, which is found only in Puerto Rico and the Virgin Islands, has milky sap and is further identified by: (1) elliptic to oblong leaves 1¼–4 inches long and ¾–1¾ inches wide, becoming nearly hairless; (2) few light yellow or whitish bell-shaped flowers 3/16 inch long at leaf bases; and (3) oblong sharp-pointed berries ½–¾ inch long.

An evergreen small to medium-sized tree to 35 feet high and 8 inches in trunk diameter. Bark gray, smooth or becoming rough, fissured, and scaly. Twigs slender, drooping, with brown pressed hairs when young.

The alternate leaves have slender petioles ⅛–¼ inch long. Blades are short- to long-pointed at apex, blunt or rounded at base, not toothed on edges, thin with many parallel fine side veins, shiny on upper surface, and paler beneath.

Flowers 1–6 on slender stalks ⅛–½ inch long at base of a leaf. The calyx is composed of 5 overlapping brown hairy sepals 1/16 inch long; the light yellow or whitish tubular corolla nearly 3/16 inch long has 5 spreading short lobes; stamens 5 on corolla tube opposite the lobes; and pistil with hairy round 5-celled ovary, short style, and 5 stigmas. The fruit has 1 narrow seed. Collected with flowers through the year, with fruits in summer.

Uncommon in dry coastal and lower Cordillera forests at 200–2,500 feet altitude on south slope of Cordillera and coastal hills of Puerto Rico. Also in Vieques, St. Croix, St. Thomas, and St. John.

PUBLIC FORESTS AND PARK.—Maricao, Susúa; Virgin Islands.

RANGE.—Known only from Puerto Rico and Virgin Islands.

BOTANICAL SYNONYM.—*Cynodendron pauciflorum* (Lam.) Baehne.

639. Caimito de perro *Chrysophyllum pauciflorum* Lam.

Flowering twig, natural size.

640. Tabloncillo ***Dipholis bellonis* Urban**

Large tree, apparently not common and imperfectly known, characterized by: (1) narrowly elliptic leaves with slightly thickened blades 3½–7 inches long and 1¼–2 inches broad, short-pointed at both ends, and slender leafstalks ½–1¼ inches long, clustered near end of twig; (2) numerous fragrant minute whitish flowers nearly 3/16 inch long and broad, borne along twig back of leaves, several together in a cluster about ½ inch across; and (3) small amount of white latex in bark.

Evergreen tree 60–100 feet tall and trunk 2–4 feet in diameter, with narrow buttresses to 10 feet high. The brown bark varies from finely fissured to rough. Inner bark is pink and bitter, with a small amount of white latex. Almost hairless throughout, except on very young leaves and twigs. The brown twigs with few branches bear the leaves singly (alternate) but clustered near apex.

Flowers have very slender stalks about 3/16 inch long. The cuplike calyx consists of 5 rounded overlapping sepals; the white corolla, or whitish tinged with green, has a short tube about 1/16 inch long and 5 rounded lobes more than 1/16 inch long, with a minute pointed lateral lobe (appendage) on each side; 5 stamens almost ⅛ inch long are attached near base of corolla tube opposite the lobes and alternating with 5 pointed petallike scales (staminodes) 1/16 inch long; and the pistil consists of 5-celled ovary more than 1/16 inch long tapering into a short, pointed style. The fruit (berry) was described as obovoid, ¾ inch long, ⅜ inch in diameter, and violet black. Collected in flower in July and August and recorded with fruit in April.

Sapwood is hard, whitish, and heavy (specific gravity 0.9). The wood is suitable for construction.

Rare in the northern limestone forest of Puerto Rico. One giant tree remains along a highway at 2,500 feet altitude in the central mountains, outside the normal range and at a higher elevation. Known previously from a fruiting specimen collected near Furnias about a century ago.

PUBLIC FOREST.—Guajataca.

RANGE.—Puerto Rico

OTHER COMMON NAME.—varital (Puerto Rico).

BOTANICAL SYNONYM.—*Bumelia bellonis* (Urban) Stearn.

Domingo Bello y Espinosa (1817–1884), discoverer of this rare tree, was born in the Canary Islands but lived in Puerto Rico from 1848 to 1878. While an attorney at Mayaguez, he collected extensively. Afterwards, in 1881–1883, he published a preliminary catalog of the plants of the island.

640. Tabloncillo

Dipholis bellonis Urban

Flowering twig, natural size.

641. Espejuelo ***Dipholis cubensis*** **(Griseb.) Pierre**

This tree of central and western mountain forests is characterized by: (1) obovate or oblanceolate leaves ¾–2½ inches long and ⅜–1¼ inches wide, rounded at apex; (2) many small cup-shaped flowers along twig, 2–6 clustered at base of a leaf, 3/16 inch long, whitish and brownish green; and (3) elliptic green to dark brown or purple berries, ⅜–½ inch long.

A small evergreen tree 20 feet high and 4 inches in trunk diameter, sometimes a large tree to 75 feet tall and 14 inches in diameter, with rounded spreading crown. The bark is gray, smoothish, with many small fissures, the inner bark pink and bitter. Twigs are slender, with brown pressed hairs when young.

The alternate leaves have petioles ⅛ inch long. Blades are rounded at apex, tapering and long-pointed at base, slightly turned under at edges, slightly thickened and leathery, hairless, the upper surface green, and the lower surface light green.

Flowers about ¼ inch long at base of a leaf on slender hairy stalks ⅛ inch long. Each flower is composed of 5 overlapping hairy brownish-green rounded sepals less than ⅛ inch long; cup-shaped whitish corolla 3/16 inch long with 5 rounded lobes shorter than tube, each with 2 small lobes or appendages; 5 stamens on corolla tube opposite the lobes, also 5 sterile stamens (staminodes); and pistil with hairless 5-celled ovary and short stout style. The fleshy fruits contain 1 large seed. Flowering and fruiting irregularly during the year.

The wood is light brown and hard, reported to be durable and used for construction.

Locally common in moist limestone and Cordillera forests of western mountains of Puerto Rico at 300–2,700 feet altitude.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—cuyá, almendro silvestre (Cuba); caya de loma, jaiquí, yaití Dominican Republic); bois d'Inde, tiquimite (Haiti).

BOTANICAL SYNONYMS.—*Dipholis sintenisiana* Pierre, *Bumelia cubensis* Griseb.

642. Nisperillo ***Manilkara albescens*** **(Griseb.) Cronq.**

This small tree has been recorded from Lajas by Alain Liogier. It is described by: (1) oblong or elliptic leaves 2½–6½ inches long and 1–2¼ inches wide, mostly rounded at both ends, thick and stiff, the upper surface hairless and with inconspicuous side veins, the lower surfaces with microscopic hairs, and petioles ¼–1 inch long; (2) flowers 2–8 at leaf bases on stalks ½–¾ inch long, about ⅜ inch wide, composed of 6 overlapping finely hairy sepals 3/16 inch long, corolla ¼ inch long, with 6 lobes each with 2 appendages, stamens 12 without staminodes, and pistil with 6–10-celled ovary and stout style; and (3) round fruit ½–⅝ inch in diameter, with 1–2 seeds ⅜–½ inch long. Elsewhere the reddish wood, strong and durable, has served for poles, crossties, and naval construction. Rare at Lajas.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—acana, acana blanca (Cuba); nisperillo (Dominican Republic); bois huile, sapotille marron (Haiti).

BOTANICAL SYNONYM.—*Mimusops albescens* (Griseb.) Hartog.

641. Espejuelo *Dipholis cubensis* (Griseb.) Pierre

Flowering twig (above), fruiting twig (below), natural size.

643. Jaimiquí, wild-dilly ***Manilkara jaimiqui*** **(C. Wright) Dubard.**

Collected with young fruit in 1926 in southwestern Puerto Rico between Lajas and Parguera. Not seen by the authors. This small tree with milky sap, elsewhere becoming 33 feet high and 1 foot in trunk diameter, is distinguished by: (1) elliptic or oblong leaves 2½–4 inches long and ¾–1½ inches wide, slightly notched or rounded at apex and rounded at base, thick and leathery, becoming hairless or nearly so, with petioles ⅜–¾ inch long; (2) flowers few at leaf base on slender nodding stalks, ⅝ inch broad, with 6 hairy sepals and tubular 6-lobed light yellow corolla to ⅜ inch long; and (3) fruit a rounded but slightly flattened berry ¾–1¼ inches in diameter, with thick scaly brown outer layer and usually 1 large seed, not edible. The dark reddish, hard and heavy wood has been used elsewhere for beams and poles.

RANGE.—Southern Florida, Bahamas, Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—jaimiquí, acana (Cuba); wild-dilly (Bahamas, United States); wild sapodilla (United States); jaiqui, nisperillo, nisperillo de hoja fines, jamiquí (Dominican Republic).

BOTANICAL SYNONYMS.—*Manilkara emarginata* (L.) Britton not H. J. Lam, *Mimusops emarginata* (L.) Britton, *Achras emarginata* (L.) Little.

644. Zapote de costa ***Manilkara pleeana*** **(Pierre) Cronq.**

This tree with milky sap occurs in moist coastal forest of Puerto Rico, Vieques, St. John, and Tortola only. Distinguishing characters are: (1) large oblong to obovate leaves stiff and leathery, clustered near ends of twigs; (2) flowers 1 or 2 at leaf bases with white tubular corolla nearly ½ inch long; and (3) brown fleshy rounded but flattened fruits about 1½ inches long and 2 inches in diameter.

An evergreen tree now known mostly as a small tree 15 feet high and 4 inches in trunk diameter, sometimes to 50 feet tall and 14 inches in diameter, recorded as formerly to 65 feet. The bark of small trees is gray and fissured, the inner bark pink and slightly bitter. The twigs are brown, hairy when young, with some long slender internodes and leaves crowded at ends.

The alternate leaves are clustered near ends of twigs, with petioles ⅜–1 inch long. Blades are 3–8 inches long and 1¼–2¾ inches wide, blunt, short-pointed, or slightly notched at apex, short-pointed or rounded at base, slightly turned under on edges, with many fine straight parallel side veins, the upper surface slightly shiny dark green and hairless, and the lower surface dull light green and hairless or finely hairy, with prominent midvein.

Flowers on slender finely hairy stalks ½–1¾ inches long are composed of 6 finely hairy narrow pointed sepals ⅜ inch long; white corolla with tube 3/16 inch long and 6 very narrow spreading lobes ¼ inch long, each with 2 lobes or appendages; 6 stamens ¼ inch long borne on corolla tube, also 6 sterile stamens (staminodes); and pistil with flattened brown hairy ovary 6–12-celled and long slender style. The berries have a thick slightly rough outer layer, pinkish pulp with white sticky latex and are almost tasteless and not eaten. There are 3–8 large seeds about ¾ inch long. Flowering and fruiting irregularly over the year.

The wood is hard and light brown. It might be similar in properties and uses to the related species No. 209, ausubo, *Manilkara bidentata* (A. DC.) Chev.

Rare in dry and moist coastal forests and lower Cordillera through northern Puerto Rico and southern foothills, from sea level to 400 feet altitude. Also Vieques, St. John, and Tortola. Observed also on coastal sand dunes.

PUBLIC FORESTS AND PARK.—Guajataca, Susúa; Virgin Islands.

RANGE.—Known only from Puerto Rico and Virgin Islands.

OTHER COMMON NAMES.—mameyuelo, ausubo machuelo, ausuba (Puerto Rico).

BOTANICAL SYNONYMS.—*Manilkara duplicata* (Sessé & Moc.) Dubard, *Mimusops duplicata* (Sessé & Moc.) Urban.

The scientific name honors Auguste Plée (1787–1825), from France, who made a large plant collection in Puerto Rico in 1822–1823. However, the first collection was by the expedition to Mexico in 1788–1804 by Martín Sessé, of Spain, and José Mariano Mociño, of Mexico. Unfortunately, the manuscript with their name of this species was not published until nearly a century afterwards.

644. Zapote de costa *Manilkara pleeana* (Pierre) Cronq.

Twig with flower and immature fruit (above), fruit (lower left), two-thirds natural size.

645. ***Pouteria dictyoneura*** **(Griseb.) Radlk.**

This tree of limestone hills of northern Puerto Rico, once named as a distinct species, is characterized by: (1) oblong lanceolate leaves 2½–4½ inches long and 1–1½ inches wide, with long whitish hairs beneath; (2) flowers about ⅛ inch long, grouped at leaf bases; and (3) rounded or elliptic berry ¾–1 inch long.

An evergreen large tree to 70 feet high and 2 feet in trunk diameter, with buttressed base. The twigs are covered with pressed rusty hairs.

Leaves alternate, with petioles ¼–⅝ inch long. Blades are short-pointed or blunt at apex, rounded or short-pointed at base, the upper surface hairless except on midvein, the lower surface with long whitish hairs and prominent side veins.

Flowers several at base of leaf have hairy stalks ¼–⅜ inch long, 4–5 hairy sepals more than 1/16 inch long, corolla about ⅛ inch long, tubular with 4–5 rounded lobes, 4–5 stamens on corolla opposite lobes and separated by 5 sterile stamens (staminodes), and pistil with hairy 2–3-celled ovary and short style. The fruit is sparsely hairy and has 1 rounded seed ⅝ inch long. With flowers in spring and fruits in summer.

The wood is reported to be reddish and hard and used elsewhere in rural construction.

Uncommon in moist limestone forest at 300–1,000 feet altitude in limestone foothills of northern Puerto Rico.

PUBLIC FORESTS.—Cambalache, Guajataca, Río Abajo, Vega.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—cocuyo, sapote culebra de costa (Cuba); cuero de puerco, tomasina, caracol (Dominican Republic).

BOTANICAL SYNONYMS.—*Paralabatia portoricensis* Britton & Wilson, *P. fuertesii* Urban.

This species was first found in Puerto Rico on limestone hills at Dominguito near Arecibo and was named in 1926 as a new species, *Paralabatia portoricensis* Britton & Wilson. However, it was afterwards united with this species of Cuba and Hispaniola under a variety or subspecies known also from Hispaniola (*Pouteria dictyoneura* (Griseb.) Radlk. var. *fuertesii* (Urban) Baehni; ssp. *fuertesii* (Urban) Cronq.).

646. ***Pouteria hotteana*** **(Urban & Ekman) Baehni**

This species discovered in mountains of Haiti has been found also in Puerto Rico in recent years. A medium-sized evergreen tree to 40 feet high and 10 inches in trunk diameter, distinguished by: (1) alternate or nearly opposite, broadly obovate leaves, 3–6 inches long and 2–3½ inches broad, rounded at apex and blunt at base, slightly thickened and shiny, becoming hairless, with 8–14 lateral veins at nearly right angle, and with short petiole ¼–⅜ inch long; and (2) stalkless round fruits 1¼–2¼ inches in diameter, brown, warty, thick-walled, with 2–4 large oblong light brown seeds 1–1¼ inches long. With flowers in spring and fruits in summer. Rare in lower Cordillera forest at 1,000–2,000 feet altitude on southern slopes of western mountains of Puerto Rico.

PUBLIC FORESTS.—Maricao, Susúa.

RANGE.—Puerto Rico and Hispaniola.

645. *Pouteria dictyoneura* (Griseb.) Radlk.

Fruiting twig (above), seed (lower left), flowers (lower right), natural size.

647. Mamey sapote, sapote ***Pouteria sapota*** **(Jacq.) H. E. Moore & Stearn***

Sapote or mamey sapote, a tree with milky latex, is rarely cultivated for its large edible fruits. Identified by: (1) mostly large reverse lance-shaped (oblanceolate) or narrowly obovate leaves short- or long-pointed at apex and gradually tapering to long-pointed base, clustered at ends of the stout twigs; (2) many cup-shaped or bell-shaped pale yellow flowers about ½ inch long, almost stalkless in clusters on twigs back of leaves; and (3) brown egg-shaped to elliptic fruits 4–6 inches long and 3–4 inches wide, with sweetish soft pink-red or purplish flesh and milky sap.

Medium-sized tree 30–60 feet high and 1½ feet in trunk diameter, elsewhere becoming much larger, to 80–100 feet tall and 2 feet or more in trunk diameter. The rounded crown has evergreen or deciduous foliage. The bark is reddish brown and shaggy, with milky sap or latex. The stout gray twigs are finely rusty-red hairy at apex and bear leaves singly (alternate) but clustered near end.

Petioles are ½–1½ inches long, rusty-red hairy when young. Blades are mostly 5–14 inches long and 1½–5 inches wide, thickened and leathery, slightly shiny or dull, the prominent lateral veins straight and parallel, nearly hairless except on veins beneath, the upper surface dark green, and lower surface light green.

Many flowers are produced along the stouter twigs back of leaves, several together and almost stalkless. There are 8–12 overlapping light brown rounded hairy sepals ⅛–¼ inch long, the large ones inside; the pale yellow corolla ⅜ inch long with tube and 5 blunt lobes a little longer than tube, spreading slightly to ⅜ inch across; 5 yellowish stamens 3/16 inch long at end of corolla tube and opposite the lobes and alternating with 5 pointed lobes (staminodes); and yellowish pistil almost ⅜ inch long, with conical 5-celled ovary and style.

The brown, finely scaly, edible fruit (berry) is rounded at base and blunt-pointed at apex. There are 1 or 2 large elliptic shiny brown seeds 2½–3 inches long, slightly flattened and with long gray rough scarlike area on 1 side.

The wood is light reddish or brown, moderately hard and heavy (specific gravity about 0.6), strong, and fairly durable. Elsewhere it has been used in rural carpentry and for cabinetwork and carriages, but generally the trees are saved for their fruits.

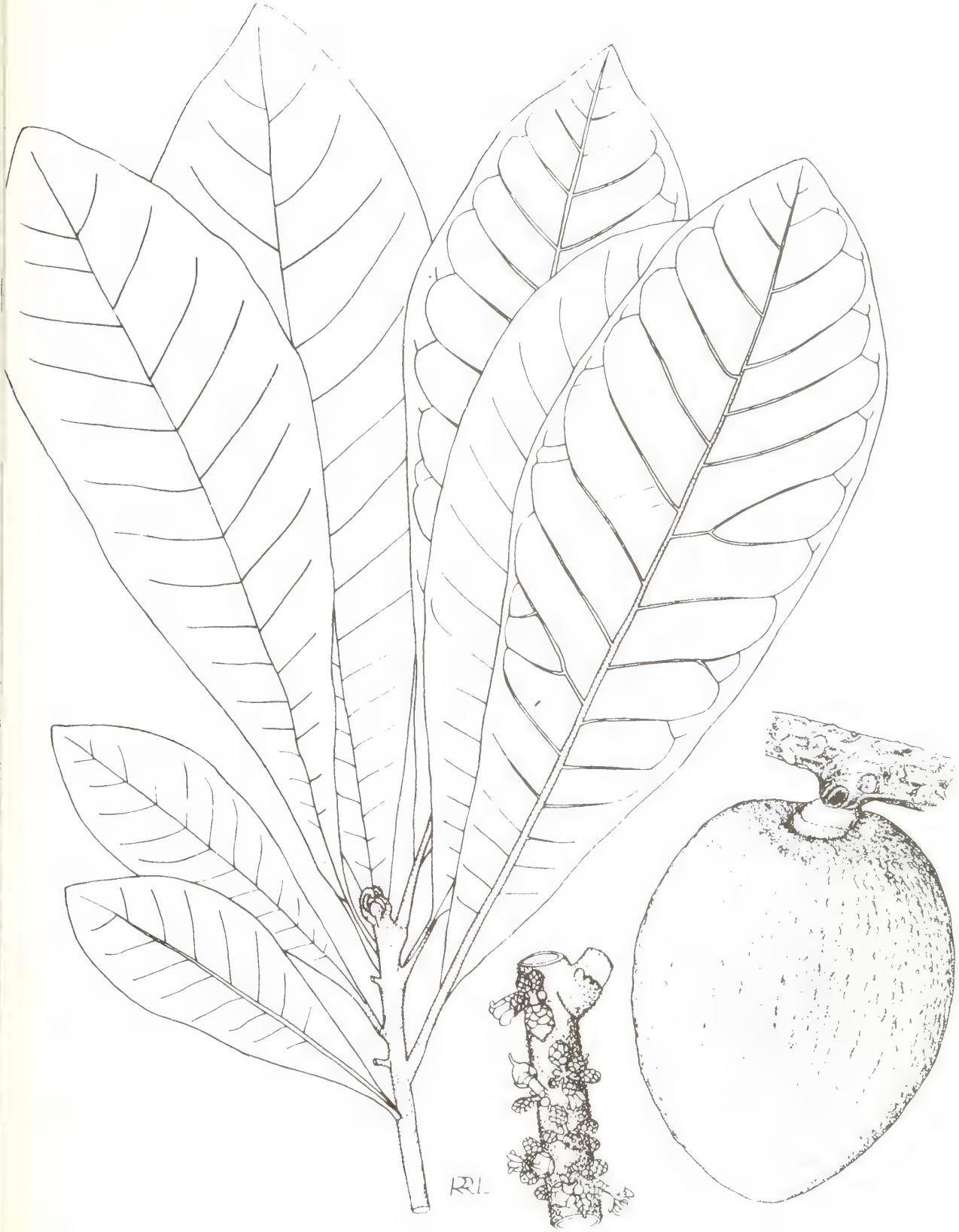
Sapote or mamey sapote is one of the best known native fruit trees of tropical America. The fruits have a distinctive sweetish flavor, or insipid to some persons, and usually are eaten raw. However, they are prepared also into a marmalade or jelly and sherbets and ice cream. Elsewhere the ground seeds, which have flavor like bitter almonds, have served as sweetmeats, for flavoring chocolate and candy, and in a beverage. The seeds also are reported to be poisonous. Oil from the seeds was used by the Aztec Indians for dressing the hair and has been employed in home medicine. Also a honey plant.

Rarely planted at low altitudes in Puerto Rico, for example, at Bayamón, for fruit and shade, but not native or naturalized. Also reported from Virgin Islands.

RANGE.—Widely planted in tropical America from southern Florida (rare) and Bermuda through West Indies from Cuba to Grenada and Trinidad and Tobago and from southern Mexico through Central America to Ecuador and Brazil. The original natural range uncertain, probably southern Mexico and northern Central America to Nicaragua. Found native in northeastern Nicaragua.

OTHER COMMON NAMES.—mamey rojo, sapote (Puerto Rico); sapote, zapote, mamey, mamey colorado (Spanish); zapote colorado, zapote mamey (Mexico); sapote grande (Nicarague); zapotillo (Costa Rica); mamey de tierra (Panama); sapote (English); mammee sapota (Bermuda); mamee-apple, mamee sapote (British Honduras); sapotier jaune d'oeuf, sapotillier marmelade, grand sapotillier (Haiti); sapote à creme (Guadeloupe); sapote, grosse sapote (Martinique); sapota (Brazil).

BOTANICAL SYNONYMS.—*Calocarpum mammosum* (L.) Pierre, *C. sapota* (Jacq.) Merrill, *Lucuma mammosa* (L.) Gaertn. f., *Pouteria mammosa* (L.) Cronq.



647. Mamey sapote, sapote *Pouteria sapota* (Jacq.) H. E. Moore & Stearn*

Leafy twig (above), flowers and fruit (lower right), two-thirds natural size.

EBONY FAMILY (EBENACEAE)

Trees, sometimes shrubs, known by: (1) leaves alternate simple, entire, thickened, without stipules; (2) flowers small, unisexual (generally dioecious), lateral, solitary or few, regular, with persistent 3–7-lobed calyx, tubular corolla urn- or bell-shaped and 3–7-lobed, stamens generally double or triple the lobes and inserted in tube, and pistil with superior ovary of 2–16 cells each with 2 ovules and 2–8 styles and stigmas; and (3) fruit a berry (sometimes edible) with few large seeds.

Key to species

A. Leaves narrowly elliptic, broadest at middle, leathery, forming fine network on drying; flowers 3-parted; fruit with enlarged 3-pointed calyx at base—649. *Diospyros sintenisii.*

AA. Leaves elliptic to obovate, broadest beyond middle, slightly thickened, blackening in drying; flowers 4-parted; fruit with enlarged 4-lobed calyx at base—648. *Diospyros revoluta.*

648. Guayabota — *Diospyros revoluta* Poir.

Characteristics of this rare tree are: (1) blackish bark, finely fissured and peeling off, exposing gray beneath; (2) elliptic to obovate leaves, slightly thickened, blackening in drying; (3) small white fragrant flowers with 4-lobed corolla at leaf bases, male and female on different trees; and (4) round fruits 1¼ inches in diameter, with enlarged 4-lobed calyx at base.

Evergreen large tree to 80 feet high and 2 feet in trunk diameter, with slight enlargements or buttresses at base. Beneath the blackish bark, the inner bark has a thin blackish layer and is light yellow and bitter. Young twigs are finely hairy, slightly angled, ending in a narrow bud formed by a minute hairy young leaf, without stipules.

The alternate leaves have stout leafstalks ¼–½ inch long. Blades are 2½–7 inches long and 1⅜–3 inches wide, rounded, blunt, or notched at apex, broadest beyond middle and tapering to short-pointed base, slightly thickened, slightly turned under at edges, hairless, upper surface shiny green with many fine nearly parallel straight side veins, and lower surface dull green.

Flowers are male and female at leaf bases on different trees (dioecious). Male flowers are clustered on slender stalks, about ½ inch long, consisting of 4-lobed calyx, tubular 4-lobed white corolla, and many stamens; female flowers not seen. The fruit is a large pulpy berry with large flat almost square 4-lobed calyx ⅝ inch across at base, and with minute point at apex. There are several flat hard seeds. Flowering in spring and fruiting in summer.

The poisonous fruits and chipped pieces of bark have been used elsewhere as a fish poison.

The heartwood is blackish and hard.

Rare in moist coastal, limestone, and lower Cordillera forests from sea level to 2,000 feet altitude in Puerto Rico. In the northeastern part near Dorado and Toa Alta.

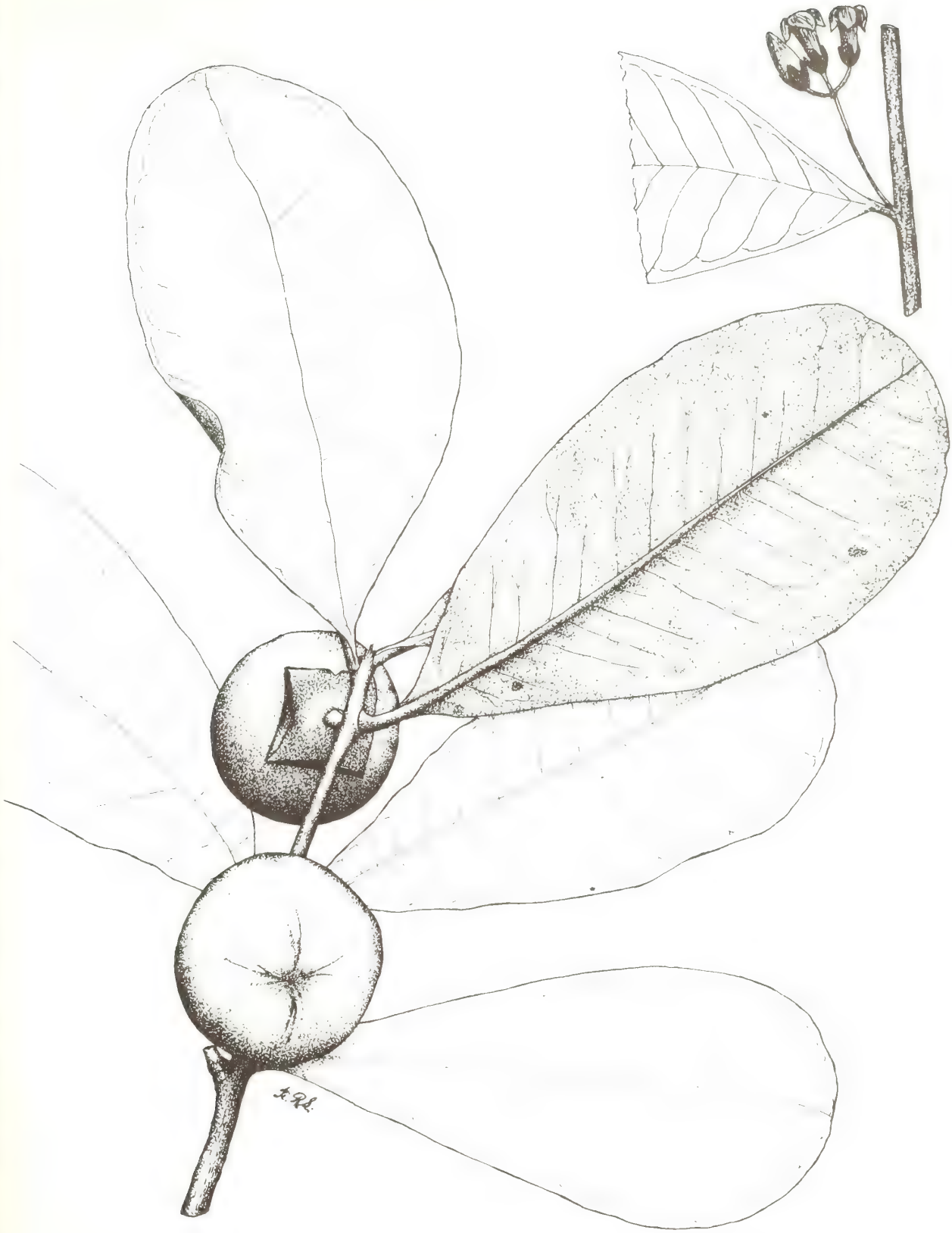
PUBLIC FORESTS.—Maricao, Río Abajo.

RANGE.—Puerto Rico and Lesser Antilles, including St. Kitts, Montserrat, Marie Galante, Guadeloupe, and Dominica.

OTHER COMMON NAMES.—zapote negro (Puerto Rico); ébano (Dominican Republic); black-apple (Montserrat); babará bambarat, black-apple (Dominica); barbaquois, bois noire, plaqueminier, bois négresse ébène (Guadeloupe).

This Puerto Rican tree and a related species of sapote negro or black-apple native in Mexico and Central America both have been known as *Diospyros ebenaster* Retz. The latter, now bearing the name *Diospyros digyna* Jacq., differs in having oblong-lanceolate leaves evenly tapered at both ends or rounded at base and short-pointed at apex, also larger edible fruits about 2 inches in diameter. It has been planted for its fruits and introduced into Cuba, Hispaniola, Brazil, the Philippines, and elsewhere in the Pacific area.

The true ebonies of commerce, Old World timbers with black heartwood, belong to the mostly tropical genus *Diospyros.* Other examples are the persimmons with edible fruits, among them common persimmon (*Diospyros virginiana* L.) of eastern United States south to southern Florida.



648. Guayabota

Diospyros revoluta Poir.

Fruiting twig and male flowers (upper right), natural size.

649. Guayabota níspero ***Diospyros sintenisii*** **(Krug & Urban) Standl.**

This small tree known only from western Puerto Rico is characterized by: (1) narrowly elliptic leathery leaves 2–6 inches long and ¾–2 inches wide, with edges slightly curved under, alternate and hairless; and (2) rounded brown hard berrylike fruit 1–1⅜ inches in diameter and nearly as long, with large thick bell-shaped 3-pointed calyx at base.

Small evergreen tree becoming 30 feet high, sometimes 40 feet, and 6 inches in trunk diameter. The bark is dark gray, smoothish, becoming slightly fissured with short cracks. Inner bark is thin, light pink, tasteless. Twigs are slender, light gray, with fine pressed hairs when young. Buds are narrow, hairy, ⅛–¼ inch long, composed of young finely hairy leaves.

Leaves alternate, apparently in 2 rows, without stipules, hairless at maturity. Leafstalks are ⅛–¼ inch long, light green, curved, flattened above. Blades are blunt at apex, short-pointed at base, the sides slightly turned up from light yellow midvein, the side veins inconspicuous but forming a fine network on drying, the upper surface dark green and slightly shiny, the lower surface dull light green.

Flowers in this genus are male and female on different trees (dioecious) but have not been described for this species. A specimen collected in 1938 has female flowers, which are illustrated here. The female flowers are ⅜ inch long and broad, stalkless, with calyx ⅜ inch long, deeply 3-lobed and slightly hairy, and hairy 3-lobed corolla within. The fruit (berrylike) is borne singly, shiny green when immature, becoming brown or dark red, hard-walled and 5–6-celled, rarely 4-celled. The base of the style remains as a point at apex, and at the base the much enlarged 3-lobed and triangular dark brown hard calyx nearly 1 inch across. Seeds 1 (or none) in each cell, elliptic, blackish, about ⅝ inch long. Flowering in spring, maturing fruits in summer.

The brown hard wood is reported to be heavy and strong.

Uncommon in moist limestone and lower Cordillera forests at 300–2,500 feet altitude in mountains of western Puerto Rico. Discovered near Lares by the botanical collector P. Sintenis in 1886 and apparently not found afterwards for many years. Collected as far east as Bayamón and west to Susúa and Maricao.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAMES.—guayabota, tabeiba, múcaro (Puerto Rico).

BOTANICAL SYNONYM.—*Maba sintenisii* Krug & Urban.

649. Guayabota níspero *Diospyros sintenisii* (Krug & Urban) Standl.

Fruiting twig (upper left) and twig with female flowers, natural size.

STORAX FAMILY (STYRACACEAE)

Trees mostly small, sometimes large, and shrubs, known by: (1) leaves alternate simple, entire or toothed; thin or thickened, with star-shaped or scaly hairs, without stipules; (2) flowers sometimes showy, in racemes, bisexual, regular, with persistent 4–5-toothed calyx, corolla generally white with short tube and 4–6 lobes almost separate, stamens 8–12, double the number of lobes, united toward base on corolla, and pistil with ovary superior or partially inferior, incompletely 3–5-celled below and 1-celled above, with 2 to many ovules, style, and 1–5 stigmas; and (3) fruit a 1-seeded drupe or capsule. One native tree species in Puerto Rico.

650. Palo de jazmín — *Styrax portoricensis* Krug & Urban

One of the rarest tree species in Puerto Rico, native in Luquillo and Carite Mountains and recently rediscovered. It is characterized by: (1) scalelike or star-shaped hairs on the twigs, petioles, veins of lower leaf surfaces, branches of flower clusters, flowers, and fruits; (2) elliptic leaves 2¾–4¾ inches long and 1¼–2 inches wide; (3) few 5-parted or star-shaped whitish flowers about ½ inch broad, drooping on short curved stalks in lateral clusters; and (4) elliptic, pointed, gray-green fruits 1–1¼ inches long, with cup-shaped calyx at base.

An evergreen tree to 65 feet high. The slender twigs are densely covered with scalelike hairs.

Leaves alternate, with petioles ¼–⅜ inch long. Blades short- or long-pointed at apex, short-pointed at base, thin, turned under at edges, the upper surface shiny green and hairless, the lower surface dull green and with few scalelike hairs.

Flowers 3–7 in lateral clusters (racemes), drooping on curved stalks ⅜–⅝ inch long, composed of cup-shaped 5-toothed calyx ⅛ inch long; deeply 5-lobed white corolla silvery hairy on inner surface; 10 crowded stamens united at base; and pistil with scaly ovary. The dry hard fruits curved down on stalks ½ inch long are densely scaly hairy, have cup-shaped calyx persistent at base, and contain 1 seed ¾ inch long.

Specimens with flowers in September and with fruits in April and July 1885 were obtained by P. Sintenis at Sierra de Naguabo and Yabucoa and were named in 1892. Rediscovered by Claud L. Horn and Leslie R. Holdridge, of the Forest Service, and collected with flowers in October 1935. Fruits from near El Verde were submitted for identification in 1954. Found by Woodbury along Espiritu Santo River in Carite (Guavate) Forest.

Very rare in Luquillo Mountains.

PUBLIC FORESTS.—Carite, Luquillo.

RANGE.—Known only from Puerto Rico.

650. Palo de jazmín *Styrax portoricensis* Krug & Urban

Flowering twig, natural size.

SWEETLEAF FAMILY (SYMPLOCACEAE)

Trees generally small, sometimes large, and shrubs, known by: (1) leaves alternate simple, thickened, with entire or toothed border, generally hairless and shiny and often yellow green, without stipules, with very short petiole; (2) flowers small, crowded in racemes or panicles, bisexual, regular, with persistent 5-toothed calyx, corolla white with 5–10 lobes divided almost to base, 4 to usually many stamens inserted in tube and often united in groups, and pistil with inferior ovary containing 2–5 cells of 2 ovules each, style, and stigma often 2–5-lobed; and (3) fruit an elliptic drupe or berry with ring and calyx at apex. Also vol. 1, p. 456.

Key to species

A. Twigs and petioles hairless or nearly so; leaves thin, hairless, with scattered wavy teeth along edges—215. Aceituna blanca, candlewood, *Symplocos martinicensis* Jacq.

AA. Twigs and petioles hairy; leaves thickened, turned under at edges.

B. Twigs and petioles slightly hairy; leaves slightly thickened, slightly turned under at edges, the lower surface hairy on raised veins—652. *Symplocos micrantha.*

BB. Twigs and petioles with stiff reddish brown hairs; leaves thick and stiff, very convex and almost saucer-shaped, with edges much turned under, the lower surface bristly hairy, especially on midvein—651. *Symplocos lanata.*

651. Níspero cimarrón — *Symplocos lanata* Krug & Urban

This shrub or small tree is confined to high mountains of central and western Puerto Rico. It is recognized by: (1) stiff reddish brown hairs on young twigs and leafstalks; (2) elliptic leaves very convex and almost saucer-shaped, thick and stiff, very shiny light green above, bristly hairy beneath; (3) small white tubular flowers nearly ¼ inch long and broad, 1–3 stalkless at leaf bases; and (4) cylindric dark brown very hairy fleshy fruits ½ inch long and less than half as broad.

Evergreen shrub or small tree to 15 feet high and 3 inches in trunk diameter, reported to reach 30 feet. The bark is gray, smooth to slightly fissured. Inner bark is red and pink streaked, bitter. The twigs are short and stout, much branched, brown and slightly fissured, densely hairy when young.

The alternate leaves have short leafstalks ⅛ inch long, with stiff reddish brown hairs. Blades are 1¼–3 inches long and ¾–1½ inches wide, very convex with edges much turned under, midvein and the few side veins sunken, short-pointed at apex, rounded at base, the upper surface very shiny light green and hairless, with veins much sunken, and the lower surface dull light green and bristly hairy, especially on the raised midvein.

One to 3 fragrant small white flowers are borne at a leaf base. A densely brown hairy base (hypanthium) 1/16 inch long and broad, bears 5 pointed hairy sepals and the white corolla less than 3/16 inch long, including short tube and 5 rounded lobes. Many white stamens 1/16 inch long are borne on the corolla tube. The pistil has an inferior 2-celled ovary, slender style, and rounded stigma. The fruits (drupes) have the 5 hairy sepals persistent at apex. Collected with flowers in spring and with fruits in summer.

The wood is light brown and soft.

Rare in dwarf forests in mountains of central and western Puerto Rico, including dwarf forest at summit of Cerro de Punta, altitude 4,390 feet.

PUBLIC FORESTS.—Guilarte, Toro Negro.

RANGE.—Known only from Puerto Rico.

651. Níspero cimarrón *Symplocos lanata* Krug & Urban

Fruiting twig, natural size.

652. Aceitunilla ***Symplocos micrantha*** **Krug & Urban**

A small tree known only from eastern and central mountains of Puerto Rico. It is identified by: (1) young twigs and leafstalks hairy; (2) broadly elliptic leaves, slightly thickened, with edges finely wavy and slightly turned under, shiny green with midrib and side veins slightly sunken; (3) several small white hairy flowers clustered and stalkless at leaf bases, nearly ¼ inch long; and (4) cylindric blackish hairy fruit nearly ⅜ inch long.

Evergreen shrub or small tree to 30 feet high and 6 inches in trunk diameter. The finely hairy twigs end in a narrow pointed hairy bud ¼ inch long.

The leaves are alternate in 2 rows on hairy leafstalks ⅛–⅜ inch long. Blades are 1½–3½ inches long and 1–2¼ inches wide, abruptly short-pointed at apex and blunt or rounded at base, the upper surface hairless, and the lower surface light green and hairy on the raised veins.

The flowers are composed of a densely brown hairy base (hypanthium) 1/16 inch long, 5 pointed hairy sepals, the white tubular corolla ⅛ inch long, with short tube and 5 rounded lobes, many stamens on the corolla tube, and the pistil with inferior 2-celled ovary, short style, and rounded stigma. The cylindric fruits (drupes) have the hairy sepals at apex. Collected with flowers from fall to spring and with fruits in summer and fall.

Rare in dwarf forest at 2,500–4,000 feet altitude on mountain tops in eastern and central Puerto Rico.

PUBLIC FORESTS.—Luquillo, Toro Negro.

RANGE.—Known only from Puerto Rico.

This species and No. 651, níspero cimarrón, *Symplocos lanata* Krug & Urban, of the central and western mountains, are closely related and possibly variations of one species. Both apparently developed from a common ancestor after geographic separation in the Puerto Rican mountains.

Symplocos polyantha Krug & Urban, palo de cabra, is reduced here to a synonym of No. 215, aceituna blanca, candlewood, *Symplocos martinicensis* Jacq. The first species was known only from the type collection in Luquillo Mountains by H. F. A. Eggers in 1883. It was distinguished mainly by larger flower clusters bearing many flowers.

652. Aceitunilla

Symplocos micrantha Krug & Urban

Flowering twig, natural size.

OLIVE FAMILY (OLEACEAE)

Trees and shrubs, sometimes woody vines, known by: (1) leaves opposite simple (pinnate in ash, *Fraxinus*), generally entire and thickened, without stipules; (2) flowers mostly small (sometimes showy), commonly in panicles, generally bisexual (dioecious in ash, *Fraxinus*), regular with 4-lobed calyx, corolla tubular and generally 4-lobed (rarely none), stamens 2 inserted on corolla, and pistil with superior ovary of 2-cells each usually with 2 ovules, style, and 1–2 stigmas; and (3) fruit a berry, drupe, capsule, or samara. Also vol. 1, p. 458.

Key to species

A. Leaves pinnate with 5–9 lanceolate finely toothed leaflets; fruit a key (samara)—656. *Fraxinus uhdei.**
AA. Leaves simple; fruit a slightly fleshy drupe.
B. Flowers minute, greenish, without corolla, male and female on different plants (dioecious)—*Forestiera.*
C. Leaves less than 2 inches long, not toothed on edges; twigs hairy when young.
D. Leaves ovate to oblong-lanceolate, short- to long-pointed at apex, slightly wavy on edges; fruit narrowly oblong, ⅜–½ inch long—653. *Forestiera eggersiana.*
DD. Leaves narrowly elliptic or diamond-shaped, straight on edges; fruit elliptic, ⅜ inch long—655. *Forestiera segregata.*
CC. Leaves 2–3 inches long, elliptic, usually finely toothed toward short- or long-pointed apex; fruit elliptic, less than ¾ inch long—654. *Forestiera rhamnifolia.*
BB. Flowers larger, whitish, with corolla, bisexual.
E. Corolla of 4 very narrow petals—*Linociera.*
F. Leaves narrowly elliptic, 3–6 inches long.
G. Flower clusters (panicles) lateral; calyx hairy—661. *Linociera caribaea.*
GG. Flower clusters (panicles) terminal and lateral; calyx hairless or with minute hairs around edges—216. Hueso blanco, *Linociera domingensis* (Lam.) Knobl.
FF. Leaves elliptic, oblong, or lanceolate, less than 3 inches long.
H. Leaves stiff, very thick and leathery, often with tufts of minute hairs in angles of side vein with midvein beneath—662. *Linociera holdridgii.*
HH. Leaves less thick and leathery, hairless.
I. Flowers few to several in short clusters at leaf bases; twigs finely hairy—660. *Linociera axilliflora.*
II. Flowers many in terminal and lateral clusters; twigs hairless—663. *Linociera ligustrina.*
EE. Corolla with short tube and 4 lobes.
J. Corolla with 4 very narrow spreading lobes nearly ½ inch across; leaves obovate, short-pointed at apex—657. *Haenianthus salicifolius.*
JJ. Corolla with 4 narrow lobes ¼ inch across—*Ligustrum.*
K. Leaves oblong, less than 1¾ inches long, thin, with minute point at blunt apex; twigs long and slender, finely hairy—658. *Ligustrum sinense.**
KK. Leaves ovate, more than 2 inches long, slightly thickened, with short-pointed or blunt apex; twigs shorter, hairless—659. *Ligustrum japonicum.**

653. *Forestiera eggersiana* Krug & Urban

Main characteristics of this rare shrub or small tree are: (1) paired short-stalked ovate to oblong-lanceolate leaves ¾–2 inches long, ¼–¾ inch wide, short- to long-pointed at apex, short-pointed at base, slightly wavy-toothed on edges; (2) few minute flowers at leaf bases, male and female on different plants (dioecious); and (3) fruits (drupes) narrowly oblong, ⅜–½ inch long.

An evergreen shrub 10 feet high or a tree to 16 feet and 3 inches in trunk diameter. Twigs slender, finely hairy when young.

The opposite leaves have petioles less than ⅛ inch long. Blades are slightly thickened, hairless, the upper surface shiny green, and the lower surface paler and with dots when dry.

The nearly stalkless flowers less than ⅛ inch long have minute calyx and no corolla. Female flowers have pistil with rounded ovary and short slender style.

Rare in moist limestone forest and moist coastal hills from sea level to 300 feet altitude. In Puerto Rico found only near Quebradillas. Also Desecheo and islands east of Puerto Rico, including Vieques, Culebra, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC PARKS.—Virgin Islands, Gorda Peak.

RANGE.—Known only from Puerto Rico and Virgin Islands, St. Martin, and St. Barts.

First collected in 1871 on St. Thomas by Henrik Franz Alexander von Eggers (1844–1903), Danish army captain, plant collector, and author of a flora of the Virgin Islands (*21*).

653. *Forestiera eggersiana* Krug & Urban

Leafy twig (above), twig with female flowers and fruits (below), natural size.

654. ***Forestiera rhamnifolia* Griseb.**

A shrub or small tree rare in St. Croix and Mona Island. It is distinguished by: (1) paired elliptic leaves 2–3 inches long, slightly thickened, usually finely hairy toward apex; (2) few minute greenish flowers on twigs, male and female on different plants (dioecious); and (3) elliptic fruits less than 3/8 inch long, pointed at both ends, 1-seeded.

Deciduous shrub or small tree 15 feet high and 3 inches in trunk diameter. The twigs are hairless.

Leaves opposite, with petioles about 1/4 inch long. Blades short-pointed or long-pointed at both ends, hairless, shiny green on upper surface, the lower surface pale green, with minute dots when dry.

Flower clusters 1/4 inch long, at nodes of twigs when leafless. Flowers have minute sepals less than 1/16 inch long, the male with 4 or fewer stamens less than 1/8 inch long. Collected with flowers in March.

Rare and local on dry coastal hills at 30–400 feet altitude on bluffs of Salt River, St. Croix, also plateau of Mona Island. Not known from Puerto Rico.

RANGE.—Cuba, Jamaica, Hispaniola (Haiti, rare), Mona, St. Croix, Guadeloupe, Martinique, and Grenada. Also Mexico and British Honduras.

OTHER COMMON NAMES.—hueso blanco, careicillo (Cuba); buckthorn forestiera (English); caca-ravet (Martinique).

654. *Forestiera rhamnifolia* Griseb.

Leafy twig (left), fruiting twig (upper right), twig with male flowers (below), natural size.

655. Ink-bush, Florida-privet ***Forestiera segregata*** **(Jacq.) Krug & Urban**

This small tree is characterized by: (1) paired narrowly elliptic or diamond-shaped leaves 1¼–2 inches long and ½–¾ inch wide; (2) minute greenish flowers ⅛ inch long, almost stalkless, without sepals and petals; and (3) elliptic purplish or blackish stone fruits ⅜ inch long.

Small evergreen tree 15 feet high, with several trunks to 3 inches in diameter. Bark whitish gray, smoothish, the inner bark light yellow with green outer layer, bitter. Twigs slender, light gray, smooth with raised dots (lenticels), when young greenish and minutely hairy, ending in brownish scaly bud 1/16 inch long.

Leaves opposite, broadest at middle, gradually narrowed to blunt apex and short petiole ⅛ inch long, not toothed on edges, slightly thickened, hairless, the upper surface shiny green and slightly curved up on sides, with few side veins, and lower surface dull light green, with minute dots when dry.

Flower clusters ⅜ inch long at leaf bases or on twigs at nodes back of leaves. Flowers several on slender stalks 1/16 inch long, mostly male and female on different trees (dioecious), without calyx and corolla. Male flowers consist of 3–4 spreading stamens ⅛ inch long. Female flowers have pistil ⅛ inch long composed of elliptic greenish ovary with 2 cells and 4 ovules, slender style, and stigma minutely 2-lobed. The fruits (drupes) have thin bitter flesh and large stone.

Uncommon in moist and dry limestone forests from sea level to 300 feet altitude. Scattered on western coasts of Puerto Rico. Also Desecheo and most islands to east, including Vieques, St. Croix, and Tortola.

PUBLIC FORESTS.—Cambalache, Guánica.

RANGE.—Bermuda and widespread through West Indies including Bahamas, Greater Antilles, and Virgin Islands. Also in southern Florida.

OTHER COMMON NAMES.—ink-bush (Virgin Islands); yanilla blanca (Cuba); ink-bush (Bahamas); Florida-privet, Florida forestiera (United States).

BOTANICAL SYNONYM.—*Forestiera porulosa* (Michx.) Poir.

655. Inkbush, Florida-privet *Forestiera segregata* (Jacq.) Krug & Urban

Twig with male and female flowers (above), fruiting twig (lower right), natural size.

656. Fresno, tropical ash ***Fraxinus uhdei*** **(Wenzig) Lingelsh.***

Fresno or tropical ash is a Mexican tree that has been introduced in forestry tests. It is identified by: (1) twigs with winter buds $\frac{3}{16}$ inch long, at end and paired at nodes, covered by few finely hairy brown scales; (2) opposite pinnate leaves with 5–9 lanceolate finely toothed leaflets on slender stalks; and (3) brown key fruits 1 inch long with narrow wing.

A deciduous tree to 50 feet high and 16 inches in trunk diameter, perhaps larger at maturity. The bark is brown, rough, and furrowed, the inner bark whitish and bitter. The twigs are green, turning brown, hairless except when young, with paired half-round leaf scars back of leaves.

The opposite pinnate leaves are 6–11 inches long and composed of a slender green hairless axis and paired leaflets on slender stalks mostly $\frac{1}{8}$–$\frac{1}{2}$ inch long. Leaflet blades are mostly 2–4 inches long and $\frac{3}{4}$–2 inches wide, long-pointed at apex, short-pointed or blunt at base, finely saw-toothed on edges, slightly thickened, the upper surface green and hairless, and the lower surface light green with small hairs along midvein.

Flower clusters (panicles) at sides of twigs are 5–8 inches long, much branched. There are many small greenish flowers with minute 4-toothed calyx, without petals, male and female on different trees (dioecious). Male flowers have 2 stamens $\frac{1}{8}$ inch long. Female flowers have a pistil $\frac{3}{16}$ inch long with ovary and 2-forked style. The key fruits (samaras) have a small nearly cylindric dark brown body $\frac{1}{4}$ inch long at base and long light brown wing $\frac{1}{4}$ inch wide, extending down to about middle of body and slightly notched at apex. Collected with fruits in August.

The light brown hard wood is suitable for timber. It could be produced in the central mountains.

This species has been planted in tests along roadsides at high altitudes in the Central Cordillera and is rare. The trees were heavily attacked by peach aphis (*Aulacaspis pentagona*). Seed was from Hawaii, where this species had been introduced.

In Mexico City and elsewhere in subtropical parts of Mexico, this species is a popular street tree and shade tree. Introduced in southern Arizona.

PUBLIC FORESTS.—Luquillo, Maricao, Toro Negro.

RANGE.—Native of western and southern Mexico from Sinaloa to San Luis Potosí and Oaxaca south to Guatemala.

OTHER COMMON NAMES.—fresno (Spanish); evergreen ash (United States; tropical ash, Shamel ash (Hawaii).

656. Fresno, tropical ash

Fraxinus uhdei (Wenzig) Lingelsh.*

Female flowers (upper right), twig with leaf, and fruits (lower left), natural size.

657. Palo de hueso ***Haenianthus salicifolius* Griseb.**

Palo de hueso, a small tree of the dwarf forest of mountain summits, is characterized by: (1) opposite obovate leaves 2–3½ inches long and ¾–1¼ inches wide, slightly thickened and without visible side veins, tapering at base to slender leafstalk ¼–¾ inch long; (2) terminal clusters of small white flowers nearly ½ inch across the 4 very narrow spreading fleshy corolla lobes; and (3) elliptic blackish stone fruit ⅝–¾ inch long.

Small evergreen tree to 20–40 feet high and 4–8 inches in trunk diameter, with spreading crown. Hairless, but the twigs, leaves, and flowers with few minute brown scales visible with a lens. Bark brown, smoothish, covered by mosses. Inner bark light brown, bitter. Twigs green, becoming brown.

Leaves opposite, without stipules, slightly thickened and succulent, short-pointed at apex, slightly turned under at edges, dull green above, dull light green beneath.

Flower clusters (panicles) terminal, branched, about 2 inches high and wide, bearing many slightly fragrant flowers on slender spreading stalks. The flower has 4 minute green sepals, white fleshy corolla ¼ inch long with short tube and 4 very narrow spreading lobes, 2 large white stamens on corolla, and pistil with 2-celled ovary and short style. The fruits (drupes) are green when immature, blunt-pointed, with thin flesh, large stone, and 1 seed. Flowering and fruiting perhaps irregularly through the year.

The wood is light brown, hard, and heavy.

Common in dwarf forest of upper Luquillo and Cordillera to mountain summits at 2,500–4,390 feet altitude, including Cerro de Punta, the highest point of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Toro Negro.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—hueso, hueso prieto (Puerto Rico); cara de hombre (Dominican Republic); caney (Cuba).

The Puerto Rican trees are classed in a variety (*Haenianthus salicifolius* var. *obovatus* (Krug & Urban) Knobl.), formerly a separate species (*H. obovatus* Krug & Urban). Other varieties are found also in Cuba and Hispaniola.

657. Palo de hueso *Haenianthus salicifolius* Griseb.

Flowering twig (upper left), fruiting twig (below), two-thirds natural size.

658. Chinese privet ***Ligustrum sinense* Lour.***

Chinese privet, an introduced hedge plant and ornamental, is recognized by: (1) opposite small oblong leaves ½–1¾ inches long and ⅜–¾ inch wide, with a minute point at the blunt apex; (2) many small fragrant white 4-parted flowers ¼ inch long and broad in branched clusters at and near ends of twigs; and (3) elliptic or rounded black fruits ¼–5/16 inch long.

Evergreen shrub or sometimes small tree to 20 feet high with several trunks to 5 inches in diameter. Bark gray, smooth, the inner bark greenish and beneath whitish, bitter. The twigs are slender and often long without branching, finely hairy.

The leaves are opposite, often in 2 rows without stipules. Petioles are slender, 1/16–3/16 inch long, finely hairy. The blades are short-pointed at base, not toothed at edges, thin, the upper surface dull green and almost hairless, and the lower surface light green, finely hairy on veins and with minute brown dots visible under a lens.

The flower clusters (panicles) are 1–3 inches long and have finely hairy slender short branches. The flower is composed of cuplike calyx 1/16 inch long, with 4 teeth; the white corolla with short tube and 4 narrow spreading lobes ¼ inch across; 2 stamens ⅛ inch long inserted on corolla; and pistil with rounded ovary, slender style, and 2-forked stigma. The fruits (drupes), green when immature, have calyx at base and minute point at apex. Flowering in spring, maturing fruits in summer.

The wood is whitish and hard.

Rarely grown for hedges and ornament in upper central mountains of Puerto Rico.

RANGE.—Native of China. Planted in continental United States and other temperate regions.

OTHER COMMON NAME.—Amur River privet (English).

Fruits of other kinds of privet are poisonous to children, if eaten.

658. Chinese privet *Ligustrum sinense* Lour.*

Flowering twig (upper left), fruiting twig (lower right), natural size.

659. Japanese privet ***Ligustrum japonicum* Thunb.***

This species of privet is distinguished by: (1) paired ovate leaves 2–3 inches long and 1–1½ inches wide, thick and leathery, shiny green above and dull yellow green beneath; (2) showy white masses of many small white fragrant flowers about ¼ inch long and broad; and (3) elliptic black berries ⅜ inch long.

An evergreen introduced shrub or small tree to 25 feet high and 10 inches in trunk diameter. Bark brown, smoothish but warty. The slender gray-brown hairless twigs have raised whitish dots (lenticels) and end in a minute scaly brown bud.

The opposite hairless leaves have short petioles ¼–⅜ inch long. Leaf blades are short- or blunt-pointed at apex, rounded or blunt-pointed at base, slightly turned under at edges, the lower surface with minute gland dots visible with a lens.

Flower clusters (panicles) are terminal, erect, and branched, to 5 inches long and broad. The flower is composed of a cuplike calyx 1/16 inch long with 4 tiny teeth; white corolla ¼ inch long from a narrow bud divided almost to middle into short funnel-shaped tube and 4 lobes spreading and curving back; 2 erect stamens from mouth of tube; and pistil with round 2-celled ovary, several ovules, slender style, and enlarged stigma. The drupelike berries have calyx at base and contain a large stone. Flowering in winter and spring.

Uncommon as a planted shrub or small tree and in hedges in Puerto Rico.

RANGE.—Native of China, Korea, and Japan. Widely planted in warm temperate and tropical regions, including southern and central continental United States north to Washington, D. C., and in Hawaii.

659. Japanese privet

Ligustrum japonicum Thunb.*

Fruiting twig (left), flowering twig (right), natural size.

660. Hueso ***Linociera axilliflora* Griseb.**

This shrub or small tree rare in western Puerto Rico is identified by: (1) leaves opposite, oblong to elliptic, 1½–2¾ inches long and ⅝–1¼ inches wide, thick and leathery; (2) flower clusters at leaf bases, compact and less than ⅝ inch long, with few to several flowers about ¼ inch long with 4 narrow flat white petals; and (3) bonelike white oblong egg-shaped fruits about ½ inch long.

An evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, with twigs mostly finely hairy.

Leaves opposite, with petioles ¼ inch long. Blades short-pointed or blunt at apex, short-pointed at base, hairless, the lower surface with network of veins.

Flower clusters (panicles) small and pressed against twig, the branches mostly finely hairy. The nearly stalkless flowers have a finely-hairy calyx less than 1/16 inch long, deeply 4-lobed nearly to base; 4 flattened white petals ¼ inch long; 2 short stamens borne at base of petals and less than half as long; and pistil with hairless 2-celled ovary, short style, and headlike lobed stigma. The fruits (drupes) contain a large stone. With flowers in spring and fruits in summer.

Elsewhere the hard wood has been used in carpentry.

Rare and local in moist limestone and lower Cordillera forests at 300–1,000 feet altitude. Southwestern slopes of mountains and Guajataca Gorge in northwestern Puerto Rico. Collected many years ago at Monte Mariel near Guánica.

PUBLIC FOREST.—Susúa.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—guaney negro, jicotea (Cuba).

BOTANICAL SYNONYM.—*Mayepea axilliflora* (Griseb.) Krug & Urban.

660. Hueso

Linociera axilliflora Griseb.

Flowering twig, natural size.

661. Avispillo ***Linociera caribaea*** **(Jacq.) Knobl.**

This species is characterized by: (1) paired narrowly elliptic leaves 3–6 inches long and 1–2 inches wide, long-pointed at both ends, slightly thick and leathery and hairless; (2) flowers with 4 very narrow threadlike white petals ¼–¾ inch long in branched lateral clusters; and (3) elliptic blackish fruit ⅝–)1 inch long, 1-seeded.

Small tree to 35 feet high and 6 inches in trunk diameter. The bark is gray, smoothish to slightly fissured, with minute warts (lenticels). Inner bark is orange brown, with bitter gritty taste. The twigs are slender, light gray, minutely hairy when young, with rounded raised leaf scars, and end in buds of paired minute narrow hairy young leaves, without stipules.

The opposite leaves have slender yellow-green petioles less than ⅝ inch long. Blades are dull green or olive green above with yellowish midrib, light green beneath.

The branched flower clusters (panicles) at leaf bases are 1–3 inches long with flowers several together stalkless at ends of long slender branches. Calyx cup-shaped, less than 1/16 inch long, 4-toothed, green and with minute hairs; corolla of 4 very narrow threadlike white petals ¼–¾ inch long; the 2 stamens less than 1/16 inch long borne at base of petals; and pistil less than 1/16 inch long with 2-celled ovary, short style, and 2-lobed stigma. The fruits (drupes) are green when immature and contain 1 large elliptic seed. Flowering and maturing fruits irregularly through the year.

The pinkish gray hard wood is used elsewhere for cabinetwork and charcoal.

Rare in moist forest from sea level to 600 feet altitude, eastern coast and foothills of Puerto Rico. Also in islands, eastward, including Culebra, Vieques, St. Thomas, St. Croix, and Jost Van Dyke.

PUBLIC PARK.—Virgin Islands.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, through Lesser Antilles from St. Martin to Grenada and Trinidad, Margarita, and Venezuela.

OTHER COMMON NAMES.—hueso (Puerto Rico); tárana (Dominican Republic); white ironwood (Montserrat); bois de fer blanc (Guadeloupe); bois de fer (Martinique); bridgo-tree (Dutch Antilles).

BOTANICAL SYNONYM.—*Mayepea caribaea* (Jacq.) Kuntze.

661. Avispillo

Linociera caribaea (Jacq.) Knobl.

Fruiting twig (above), flowers (lower left), natural size.

662. Hueso prieto ***Linociera holdridgii* Camp & Monachino**

A small tree local in dry forests of southwestern Puerto Rico and named in 1939. Distinguishing characters are: (1) paired stiff, very thick and leathery elliptic leaves 1¼–3 inches long and ½–1¼ inches wide, hairless except for tufts of minute hairs often present in angles of side veins with midvein on lower surface; (2) small white flowers about 3/16 inch long, several clustered at leaf bases; and (3) egg-shaped or elliptic black fruits ⅝ inch long, containing 1 very large seed.

An evergreen shrub or small tree to 20–40 feet high and 4 inches in trunk diameter. The bark is gray, smooth with few warty dots (lenticels), the inner bark gritty and bitter. The twigs are light gray with raised dots (lenticels), minutely hairy when young.

The opposite leaves have short petioles less than ¼ inch long. Blades are blunt, rounded, or short-pointed at apex, blunt or short-pointed at base, often slightly turned under at edges, the upper surface green and hairless and slightly shiny, and the lower surface yellow green and almost hairless, with fine network of small veins.

Flower clusters (panicles or racemes) at leaf bases are ½–1¼ inches long. Flowers are borne on finely hairy slender stalks less than ⅛ inch long and are composed of calyx with 4 minute hairy lobes, corolla of 4 narrow white petals ⅛–3/16 inch long, 2 stamens 1/16 inch long, and pistil less than ⅛ inch long with hairless ovary, slender style, and dot stigma. The stone fruits (drupes) 1 or 2 on short stalks at leaf bases, egg-shaped or elliptic, ⅝ inch long, bonelike, light green when immature, contain 1 very large seed. Collected with flowers in September and February and with fruits from January to July.

The wood is light brown and hard.

Rare and local in dry limestone forest of southwestern hills from sea level to 700 feet altitude.

PUBLIC FORESTS.—Guánica, Susúa.

RANGE.—Known only from southwestern Puerto Rico.

OTHER COMMON NAMES.—hueso, palo de hueso, espejuelo (Puerto Rico).

First collected in 1938 by Leslie R. Holdridge, then with the United States Forest Service. He wrote "Trees of Puerto Rico" (*30*, *31*) and made large collections of trees as the foundation for the work of the present authors.

662. Hueso prieto

Linociera holdridgii Camp & Monachino

Flowering twig (above), fruiting twig (below), natural size.

663. Hueso ***Linociera ligustrina* Sw.**

This small tree was not found in Puerto Rico until 1959. It is characterized by: (1) leaves opposite, elliptic to lanceolate, 1½–3½ inches long and ½–1 inch wide, slightly thickened and leathery; (2) many small very fragrant flowers about ¼ inch long, with 4 very narrow white petals and 2 very narrow stamens almost as long, in terminal clusters; and (3) dark purple or blackish bonelike elliptic fruits about ½ inch long.

A small evergreen tree to 35 feet high and 6 inches in trunk diameter, hairless. The bark is gray, rough and ridged, becoming very thick. Twigs slender, with raised dots (lenticels), ending in minute terminal bud composed of young leaves.

The opposite leaves are blunt to long-pointed at apex, gradually narrowed at base to slender petiole ¼–⅜ inch long, slightly turned under at edges, paler beneath.

Flower clusters (panicles) terminal and lateral, 1¼–3 inches long. Flowers on stalks ⅛–¼ inch long are composed of hairless 4-toothed calyx; 4 very narrow white petals ¼ inch long; 2 very narrow stamens almost as long, borne at base of petals; and pistil with 2-celled ovary, slender style, and stigma. The fruits (drupes) are slightly flattened with ridges when dry, and contain a large stone with 1–2 seeds. With flowers in spring and fruits in summer and autumn.

Rare and local in moist limestone forest at 200–400 feet altitude in northwestern Puerto Rico. Collected on rocky coastal cliffs near Aguadilla, Quebradillas, El Jobo, and San Antonio.

PUBLIC FOREST.—Río Abajo.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—lirio, cabra blanca (Dominican Republic); careicillo, perenqueta, hueso (Cuba); bois sagine (Haiti).

663. Hueso

Linociera ligustrina Sw.

Fruiting twig (above), flowers (lower right), natural size.

DOGBANE FAMILY (APOCYNACEAE)

Woody vines, also shrubs, trees sometimes large, and herbs, known by: (1) white latex or milky sap, often abundant; (2) leaves usually opposite, also alternate or whorled, simple, entire, generally with many lateral veins almost straight, without stipules; (3) flowers sometimes large, colored, and showy, fragrant, generally in cymes, bisexual, regular, with 5-lobed calyx, corolla with long narrow tube often funnel-shaped, with 5 lobes twisted in bud, 5 small stamens inserted in tube, glandular disk, and pistil with 2 distinct superior 1-celled ovaries and few to many ovules, style, and large stigma; and (3) fruit generally of 2 follicles or berries, a capsule, or a berry, the seeds sometimes hairy, flattened, or winged, the fruits and seeds poisonous in various species. Also vol. 1, p. 460.

Key to species

A. Leaves alternate.
  B. Leaves very narrow, less than ⅜ inch wide, shiny green, hairless; corolla yellow—668. *Thevetia peruviana.**
  BB. Leaves broader, larger—*Plumeria.*
    C. Leaves rounded or notched at apex, obovate or oblong, curved under at edges, hairless; corolla white—666. *Plumeria obtusa.*
    CC. Leaves pointed at apex.
      D. Leaves short-pointed, elliptic, edges not turned under, lower surface often hairy; corolla red, yellow, or white—218. Frangipani, *Plumeria rubra* L.*
      DD. Leaves long-pointed, narrowly lance-shaped, with edges curved under, the lower surface densely white hairy; corolla white—217. Aleli, milktree, *Plumeria alba* L.
AA. Leaves opposite or whorled.
  E. Leaves opposite.
    F. Leaves elliptic, broadest near or beyond middle, with petiole of ⅜–¾ inch; flowers on slender spreading stalks, corolla white—667. *Tabernaemontana citrifolia.*
    FF. Leaves oblong, broadest toward base, with petiole of ¼ inch; flowers short-stalked and crowded at nodes, corolla white or yellowish—664. *Funtumia elastica.**
  EE. Leaves whorled.
    G. Leaves mostly in 3's (sometimes 2 or 4), lance-shaped or narrowly elliptic, shiny green to dark green, almost hairless; corolla red to pink to white—665. *Nerium oleander.**
    GG. Leaves 4 of unequal size at a node, lance-shaped or narrowly elliptic, shiny yellow green; corolla small, whitish—219. Palo amargo, bitter-ash, *Rauvolfia nitida* Jacq.

664. Goma, Lagos-rubber — *Funtumia elastica* (Preuss) Stapf*

This large forest tree from western Africa, formerly of interest as a possible source of rubber, has been planted experimentally in Puerto Rico. Distinguishing characters are: (1) whitish latex in trunk; (2) paired oblong leaves 4–7 inches long and 1¾–3 inches wide; (3) many narrowly tubular white or yellowish flowers about ¾ inch long crowded at nodes; and (4) paired hard flattened dark brown pods about 5 inches long and ¾–1⅛ inches broad, flattened and widely spreading.

A large evergreen tree reported to become 100 feet high where native, with pale whitish spotted bark and whitish latex, hairless throughout. Twigs with rings at nodes.

The opposite leaves have stout petioles about ¼ inch long. Leaf blades are abruptly long-pointed at apex and short-pointed at base, slightly wavy on borders, slightly thickened, paler beneath.

Flower clusters (cymes) bear many short-stalked flowers consisting of bell-shaped calyx with 5 overlapping lobes, corolla with tube narrowed above base and 5 spreading rounded lobes, 5 stamens inserted in corolla tube, and pistil with 2-celled ovary and style. Fruit of 2 pods (follicles) each splitting open on 1 side and containing many small narrow seeds with tufts of long silky hairs.

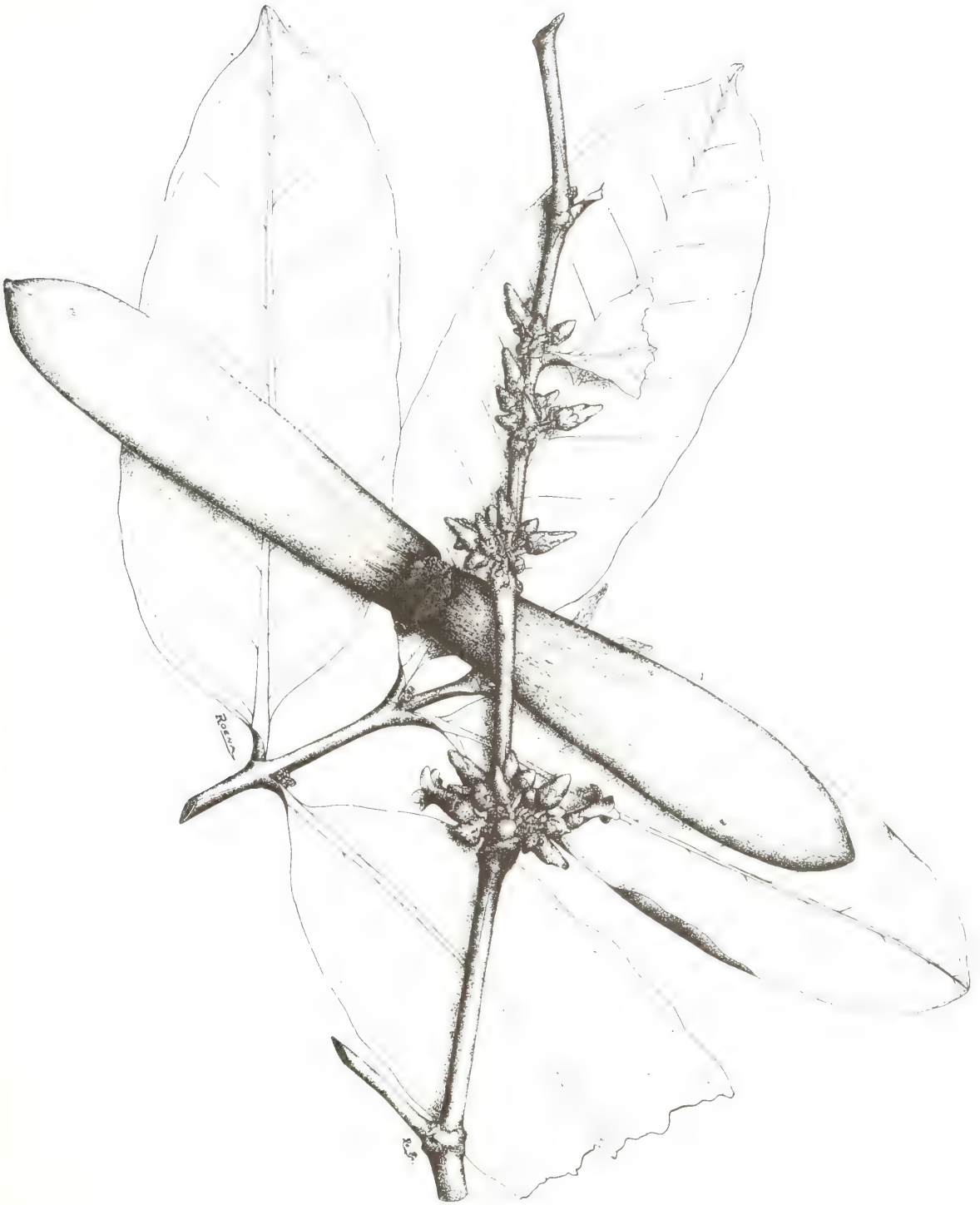
Rare in Puerto Rico except in experimental plantings.

At one time the trees were grown in Africa in rubber plantations.

RANGE.—Native of western tropical Africa and sparingly introduced in other tropical regions including West Indies, for example, in botanical gardens.

OTHER COMMON NAMES.—goma (Puerto Rico); caucho de Lagos (Cuba); ofruntum tree, silk-rubber (English); caoutchouc French.

BOTANICAL SYNONYM.—*Kickxia elastica* Preuss.



664. Goma, Lagos-rubber *Funtumia elastica* (Preuss) Stapf*

Flowers, paired fruit, and leafy twig, two-thirds natural size.

665. Adelfa, oleander *Nerium oleander* L.*

Adelfa or oleander is a familiar introduced ornamental shrub or sometimes small tree commonly planted for its clusters of large showy flowers. However, the plants including all parts and their whitish sap or latex are extremely poisonous to man and animals. Death has been caused by eating a few leaves or flowers. Distinguishing characters include: (1) narrow leathery shiny green leaves, long-pointed at both ends, mostly in 3's; (2) large tubular 5-lobed flowers about 1 inch long and 2 inches broad, varying in color from red to pink to white, not scented; and (3) fruit of 2 long stout pods 3–6 inches long.

A handsome rounded spreading evergreen shrub commonly 6–15 feet high but sometimes a small tree to 20 feet high and 3 inches in trunk diameter. The twigs are greenish brown and minutely hairy. The sap or latex is whitish, turning gray, bitter, and poisonous.

The leaves are attached closely together along the twig in groups of 3 (sometimes 2–4) at a node, or whorled, on short petioles about ¼ inch long. Leaf blades are lance-shaped or narrowly elliptic, 3–5 inches long and ½–1 inch wide, thick and stiff, with edges turned under slightly, almost hairless, with many parallel side veins, shiny green to dark green on upper surface, yellow green on lower surface.

Several to many short-stalked flowers are borne in terminal branched clusters (cymes) extending beyond the leaves. The calyx is about ¼ inch long, of 5 narrow-pointed green lobes, minutely hairy; corolla about 1 inch long, with a narrow tube and 5 broad rounded twisted spreading lobes about 2 inches across, with fringe of toothed scales at mouth of tube; 5 stamens almost ½ inch long including the thread-like hairy tip, attached at mouth of corolla tube and united with stigma; and 2 separate ovaries with a slender style ⅜ inch long. Frequently double-flowered, with many additional corolla lobes. The fruit of 2 stout pods (follicles) from a flower contains many flattened hairy seeds with a tuft of hairs. Flowering and fruiting mostly in spring and summer but continuing through the year.

The wood is described as whitish yellow, slightly hard and brittle, moderately heavy (specific gravity 0.6).

Commonly planted for ornament, hedges, and borders and in gardens and parks in various parts of Puerto Rico from low to high altitudes and in Virgin Islands to Anegada. Apparently not escaping from cultivation here.

Oleander is hardy, elsewhere withstanding both freezing temperatures of subtropical climates and also long droughts. Northward in temperate regions, it is a popular house plant grown in tubs. The shrubs are readily propagated by cuttings and can be heavily pruned and topped. Reported to have a deep root system, which does not affect underground pipes.

This species is extremely poisonous, all parts of the plant such as latex, flowers, leaves, bark, and roots being toxic. Persons have died from carelessly eating the flowers. Cattle have been killed by browsing the foliage. In spite of the deadly properties the plants have been employed in medicine as a heart stimulant and in various home remedies for assorted ailments. Insecticides and rat poisons have been made from the latex and other parts. The leaves contain varying amounts of rubber as latex. It is reported that smoke from the burning wood is toxic.

RANGE.—Native of the Mediterranean region of southern Europe and northern Africa, also southwestern Asia. Planted in tropical and subtropical regions throughout the world and reported as naturalized. Grown across southern United States from Florida to Louisiana, Texas, Arizona, and California and perhaps sparingly escaping from cultivation. Planted also in Bermuda, Bahamas, Cuba, Jamaica, Hispaniola, Puerto Rico and the Virgin Islands, Lesser Antilles, and Trinidad. Also, Mexico, Central America, and South America south to Chile and Argentina and through the Old World.

OTHER COMMON NAMES.—alelí, alhelí, alelí extranjero, laurel rosado (Puerto Rico); oleander (Virgin Islands, United States, English); adelfa, laurel rosa, laurel blanco, laurel colorado (Spanish); martinica, rosa del Perú, pirulí (Dominican Republic); rosa francesa, narciso (Cuba); narisco (Central America); narisco rosado, narciso (El Salvador); azuceno de la Habana (Colombia); rosa de berbería (Venezuela); laurel rosado (Ecuador); laurier rose, laurier tropical (Haiti); franse bloem, oleander (Dutch Antilles)

665. Adelfa, oleander *Nerium oleander* L.*

Fruits (left and lower right) and flowering twig, natural size.

666. Alelí cimarrón ***Plumeria obtusa* L.**

This species of alelí is readily distinguished from related species by its broader obovate or oblong leaves rounded or notched at apex. Other characters for identification include: (1) milky juice or white latex, which flows abundantly from cuts; (2) the form with few stout branches ending in clusters of leaves, without a crown of foliage; (3) the showy, very fragrant tubular, 5-lobed waxy, white flowers 1¾–2 inches long; and (4) paired cigarlike dark brown pods 3–6 inches long and about ½ inch in diameter.

Small evergreen tree 15–40 feet high and to 10 inches in trunk diameter, hairless throughout. The bark is gray, smoothish to slightly furrowed. Inner bark is light yellow beneath an outer green layer, bitter. The twigs are few and stout, green when young, turning gray, more than ⅜ inch in diameter, with abundant, slightly bitter, white latex.

The alternate leaves have slender leafstalks ½–2 inches long. Blades are mostly 2–5 inches long and 1–2 inches wide, sometimes larger, slightly thickened and leathery, curved under at edges, tapering to base, slightly shiny, the upper surface green, the lower surface yellow green.

Flower clusters (cymes) are borne at the end of a long stout stalk 1½–5 inches long that arises among the leaves. Crowded on short stalks are many developing narrow, twisted flower buds up to 1¾ inches long, whitish and reddish tinged and a few opening flowers. These are composed of the 5-lobed calyx 1/16 inch long; waxy corolla with narrow tube about 1 inch long and 5 narrow spreading lobes nearly 1 inch long, often with yellow dot near base inside; 5 small stamens inserted near base of tube and alternate with lobes; and pistil about ⅛ inch long, composed of 2 separate ovaries partly inferior and united with 1 stigma. From a flower develop 2 long pods (follicles), which split along 1 line to release many flat winged seeds. Flowering and fruiting nearly through the year.

The wood is light brown and slightly hard.

This native species is a potential ornamental like its relative No. 218, frangipani, *Plumeria rubra* L.* The white latex is irritating to the skin of some persons.

Locally common in dry and moist limestone and lower Cordillera forests at 200–3,000 feet altitude in mountains of western Puerto Rico, also near Arecibo and west of Florida. Common in Mona.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Bahamas, Cuba, Jamaica, Hispaniola, Mona, and Puerto Rico. Also a variety in Yucatán, Mexico, and British Honduras.

OTHER COMMON NAMES.—alelía, tabaiba, alelí de la Mona, alelí montuno (Puerto Rico); lirio (Cuba); milkwood (Jamaica); frangipani (Bahamas); alelí, flor de cerro, atabaiba (Dominican Republic); fragipanier (Haiti); oleander di Bonaire (Dutch Antilles).

BOTANICAL SYNONYMS.—*Plumeria krugii* Urban, *P. portoricensis* Urban.

666. Alelí cimarrón *Plumeria obtusa* L.

Flowering twig (upper left), paired fruits (right), two-thirds natural size.

667. Palo lechoso ***Tabernaemontana citrifolia* L.**

Tree or shrub with abundant white latex, characterized by: (1) paired elliptic leaves, long-pointed at base and abruptly long-pointed at apex, slightly thickened and succulent, the lateral veins prominent, nearly at right angles to midrib, much sunken above and raised beneath; (2) showy fragrant tubular white flowers nearly ¾ inch long more than 1 inch across the 5 overlapping spreading lobes; and (3) green fruit of 2 elliptic pointed fleshy pods (follicles) 1½–2 inches long and ⅜–⅝ inch broad, which do not open.

Small evergreen tree 25 feet tall and 4 inches in trunk diameter, reported to reach 40 feet, or shrubby, hairless throughout. The light brown bark is smooth. Inner bark, also light brown, is bitter and contains much white latex which is slightly bitter. The green twigs ringed at nodes yield abundant white latex when cut.

Petioles of the opposite leaves are ⅜–¾ inch long, and the blades 3–7 inches long and 1½–3 inches broad. Blades are broadest near or beyond middle, turned under at edges, above green or light green and shiny or dull, and beneath pale whitish green.

The lateral branching flower clusters (cymes) near apex of twig are shorter than the leaves and bear few to several flowers on slender spreading green stalks. Pointed flower buds are about ⅞ inch long. A flower has a green calyx 3/16 inch long with 5 pointed overlapping lobes; white corolla with narrow cylindric tube 9/16 inch long, and 5 broad overlapping lobes ⅝ inch long and rounded at apex; 5 stalkless green stamens ⅛ inch long inserted inside corolla tube; and pistil composed of 2 light green ovaries 3/16 inch long, 1 slender white style ¼ inch long, and enlarged stigma. The 2 separate fruits (follicles) developing from 1 flower are grooved and long-pointed and have the persistent calyx at base. Many seeds are imbedded in a fleshy orange-red pulp. With flowers and fruits through the year.

The sapwood is whitish brown, medium hard, heavy, and fine-textured.

Because of the showy white flowers, this species is suitable for planting as an ornamental. Elsewhere the caustic white sap or latex has served in home remedies.

Rare in moist limestone and lower Cordillera forests at 200–2,500 feet altitude throughout the northern limestone hills and eastern and central mountains of Puerto Rico.

PUBLIC FORESTS.—Cambalache, Guajataca, Luquillo, Maricao, Río Abajo, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico. Also Lesser Antilles from St. Martin and Saba to Grenada, Barbados, and Tobago.

OTHER COMMON NAMES.—pegoge (Puerto Rico); pitiminí, pegojo (Cuba); palo de leche (Dominican Republic); lecherillo (Mexico); cachito (Nicaragua); milkybush (St. Vincent); bois lait (Haiti, Guadeloupe, Martinique); bois lait mâle (Haiti); bois lait, milkwood (Dominica); milkytree (Dutch Antilles).

BOTANICAL SYNONYM.—*Tabernaemontana oppositifolia* (Spreng.) Urban.

The plants of Puerto Rico were named also as a distinct species but are best referred to that of nearby islands on both sides.

667. Palo lechoso *Tabernaemontana citrifolia* L.

Flowering twig and fruiting twig (lower right), two-thirds natural size.

668. Cabalonga, lucky-nut ***Thevetia peruviana*** **(Pers.) K. Schum.***

This introduced shrub or small tree with very poisonous milky juice is planted as an ornamental for its large yellow flowers. It is recognized easily by: (1) the funnel-shaped or bell-shaped waxy flowers 2–2½ inches long and broad; (2) the very narrow, linear shiny leaves 3–6 inches long and only ¼–⅜ inch wide, shiny green above and pale beneath; and (3) triangular-shaped, slightly flattened fruits, which are poisonous.

A spreading evergreen shrub or small tree 15 feet or sometimes to 25 feet high and 3 inches in trunk diameter, hairless throughout. Bark gray, slightly rough. The bark, stout twigs, and leaves abundantly exude white, poisonous latex when cut.

The very narrow leaves are borne singly or alternate but numerous and crowded. They are stalkless or nearly so, long-pointed at both ends, thick and with edges slightly turned under, with prominent midrib but without lateral veins.

The handsome sweet-scented flowers are borne on slender stalks ½–1½ inches long, several together in short, branched terminal or lateral clusters (cymes). Calyx of 5 narrow, pointed sepals ⅜ inch long; the yellow or sometimes pinkish yellow corolla with a narrow tube at base and gradually expanding into 5 overlapping and spreading, very broad and rounded lobes, with 5 hairy scales at the end of the tube; 5 small stamens on and within the corolla tube; ovary 2-lobed and 2-celled, with slender style and disk-shaped stigma.

The green, yellow, or blackish fruit is triangular-shaped and slightly flattened, about ¾ inch long and 1¼ inches broad and ½ inch thick, with thin flesh and large somewhat triangular stone almost as large as the fruit, containing only 2 large seeds. Flowering and fruiting throughout the year.

It is reported that the wood is brownish gray, hard, lightweight, fine-textured, and easily worked.

The triangular poisonous fruits, which have a line around the edge and down the center, are carried or worn as pendants and good-luck charms, as the common name lucky-nut indicates. A bright yellow oil of possible medicinal and illuminating uses can be pressed from the seeds.

Not only the juice and fruits but all parts of the plant are poisonous to humans and livestock, containing thevetin, a chemical like digitalis. The poison causes a slow and later an irregular pulse accompanied by vomiting and shock. The lucky-nut fruits have been shipped to the United States for preparation of certain heart medicines. The poisonous sap and bark have served also in folk remedies.

Uncommon as a planted ornamental in Puerto Rico, where it grows rapidly, has escaped from cultivation, and has become naturalized in coastal thickets. Also in St. Croix, St. Thomas, and St. John. Propagated from seeds. Not recommended for planting because of the dangerous poison.

RANGE.—Native in continental tropical America, perhaps Mexico and Central America, but extended greatly through cultivation and naturalization in tropics of both New and Old Worlds. Especially adapted to dry regions. Planted and naturalized in southern Florida including Florida Keys, Bahamas, Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, Lesser Antilles, and Trinidad and Tobago. Introduced northward to southern northern Florida and Arizona and south through South America to Brazil.

OTHER COMMON NAMES.—cabalonga (Puerto Rico, Spanish); caballón (Puerto Rico); lucky-nut (Virgin Islands); retama (Dominican Republic); (Cuba); chirca, campanilla (Mexico, Central America); chilca (Central America); chilindrón (El Salvador, Honduras); campanilla amarilla (El Salvador); cobalonga, cachimolivo, azuceno, cascavel, castañeto, amancay (Colombia); manzanillo, retama (Venezuela); zuche, jacapa (Ecuador); ahouay, llagas de San Francisco (Argentina); trumpet-flower, yellow-oleander, lucky-nut (United States, English); luck-seed (West Indies); luckybean-bush, good-luck-tree (Barbados); be-still-tree, noho-malie (Hawaii); bois saisissement, serpent, d'eau livre (Haiti); joro-joro, olijfi di Bonaire, yellow oleander (Dutch Antilles); jorro jorro (Surinam).

BOTANICAL SYNONYMS.—*Thevetia neriifolia* Juss., *Cerbera thevetia* L.

668. Cabalonga, lucky-nut *Thevetia peruviana* (Pers.) K. Schum.*

Flowering twig (above), fruiting twig (below), natural size.

Herbs and shrubs, often vines, rarely trees (*Calotropis*), sometimes succulent, known by: (1) milky sap; (2) leaves opposite or whorled, simple, generally entire, with stipules often minute or none; (3) flowers in clusters (cymes, like racemes, or like umbels), bisexual, regular, consisting of calyx of 5 sepals often united at base, star-shaped corolla of 5 spreading or turned back lobes, 5-lobed crown (corona) between corolla and stamens and attached to either, 5 stamens attached to corolla near base and opposite lobes each bearing 2 flat yellowish masses of pollen (pollinia), and pistil within crown composed of 2 nearly separate nearly superior 1-celled ovaries with many ovules, 2 styles, and broad flat disklike stigma; and (4) fruit of 2 elliptic pods (follicles) with many seeds with tufts of silky hairs. One introduced tree species.

669. Algodón de seda, giant milkweed ***Calotropis procera*** **(Ait.) R. Br.***

This curious introduced giant milkweed is perhaps more like a large herb than a tree but rarely reaches treelike size. The only representative of the milkweed family included here, it is easily recognized by: (1) abundant white latex, slightly bitter, in all parts; (2) large paired leaves broadly elliptic to nearly round, heart-shaped at base and nearly stalkless, slightly thick and succulent, pale yellow green above and whitish green with fine coat of soft hairs beneath; (3) many flowers more than ¾ inch across the 5-lobed slightly succulent corolla, whitish and tinged with purple; and (4) fruits 1 or 2 large swollen pods containing many seeds with tufts of long white silky hairs.

A naturalized evergreen shrub 3–6 feet high, rarely becoming treelike and 12–18 feet high, with a trunk 3–10 inches in diameter, with few stout spreading branches and no crown. Bark whitish, thick and corky, the inner bark whitish, slightly bitter, with abundant latex. Twigs stout, ⅜–½ inch in diameter, pale yellow green, minutely white hairy at tip.

The opposite leaves have stout light yellow petioles ⅛–⅜ inch long. Blades are 3–7 inches long and 2–5 inches wide, abruptly short-pointed or blunt at apex and almost clasping at the heart-shaped base, without teeth on edges, slightly leathery. The upper surface is pale yellow green with broad light yellow midvein and hairless, and the lower surface is whitish green, with midvein and main veins broad and light yellow, with fine coat of soft hairs like felt that rub off.

Flower clusters (umbellike cymes) near or at ends of twigs have stalks about 2½ inches long and bear many flowers on stalks 1 inch long in compound clusters about 3 inches across. The flower about ⅝ inch high has calyx of 5 sepals ¼ inch long, whitish green with purplish point; star-shaped corolla with short cup ¼ inch long and 5 pointed spreading lobes ⅜ inch long, whitish with purple tip and with central 5-lobed purplish crown (corona); 5 stamens attached to corolla near base and opposite lobes, each bearing in anthers under stigma 2 flat yellowish masses of pollen (pollinia); and pistil within crown, composed of 2 yellowish ovaries with many ovules, 2 slender styles, and broad flat 5-angled stigma.

The fruits are 1 or 2 large swollen elliptic pods (follicles) 3–4½ inches long and 2–2½ inches broad, slightly fleshy, opening on 1 side, yellow green but becoming brown and dry. Seeds numerous, flat, brown, 5/16 inch long, with large tuft of white hairs 1¼ inches long and 2½ inches in diameter. With flowers and fruits throughout the year.

The wood is whitish and soft.

The plants are often cultivated for ornament in dry areas of Puerto Rico and the Virgin Islands and elsewhere. Being unpalatable to sheep and cattle, they tend to spread and become common on heavily grazed pastures. In some places the silky hairs on the seeds serve for stuffing pillows. Also, the plants are used in home medicines. The foliage and fruit are covered, particularly in dry periods, by a large aphid (*Aphis nerii*), yellow or orange-yellow with 2 black appendages.

Common and scattered in dry coastal forest, waste places, heavily grazed pastures, and beaches to 600 feet altitude. Southern and eastern coasts of Puerto Rico and islands eastward. Recorded from Icacos and adjacent keys, Palominos, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FOREST AND PARK.—Guánica; Virgin Islands.

RANGE.—Native of the Old World tropics but widely introduced and naturalized through the New World tropics including West Indies and continent from Mexico to Brazil.

OTHER COMMON NAMES.—mata de seda, bomba, mudar, tula (Puerto Rico); giant milkweed (Virgin Islands, English); cow-heel (Tortola); algodón de seda (Spanish); algodón extranjero (Dominican Republic); cazuela (Cuba); árbol de seda (Colombia); calotrope, Faftan calotrope (English); St. Thomas bush, wild down, wild cotton (Bahamas); French cotton (Jamaica, Barbados) mudah (Barbados); arbre soie, coton soie (Haiti); coton de France (Martinique); liberty-tree, sprainleaf, katuna di seda, zijkatoen (Dutch West Indies); flôr da sêda (Brazil).

669. Algodón de seda, giant milkweed *Calotropis procera* (Ait.) R. Br.*

Fruit (lower left), leaf, stem with leaf bases (upper right), and flowers (lower right), two-thirds natural size.

BORAGE FAMILY (BORAGINACEAE)

Herbs, shrubs, and trees, known by: (1) leaves usually alternate simple, mostly entire, sometimes rough with stiff hairs, without stipules; (2) flowers in cymes often asymmetric in a spiral, sometimes large and showy, mostly bisexual, regular, with calyx of 5 sepals separate or united at base, corolla tubular often in form of funnel or bell, 5 stamens inserted in tube and alternate, and pistil with superior ovary 2-celled and becoming 4-celled with 4 ovules, style, and stigma sometimes with 2 or 4 lobes; and (4) fruit a drupe of 4–1 seeds or 4 nutlets. Also vol. 1, p. 466.

Key to species

A. Leaves small, less than 1½ inches long.
  B. Leaves less than ½ inch long; slender straight spines ¼ inch or more in length at nodes; corolla light yellow—676. *Rochefortia acanthophora.*
  BB. Leaves mostly ¾–1½ inches long; spines none; corolla white—670. *Bourreria virgata.*
AA. Leaves larger.
  C. Flowers large with funnel-shaped orange or red corolla more than 1 inch long; fruit egg-shaped, covered by enlarged calyx.
    D. Leaves ovate, slightly rough hairy above; flowers nearly 1½ inches long and broad—675. *Cordia sebestena.**
    DD. Leaves elliptic or oblong, usually very rough above; flowers about 1¼ inches long and 1 inch broad—674. *Cordia ricksecker i.*
  CC. Flowers smaller, less than 1 inch long, with white or yellowish corolla.
    E. Flowers tubular, narrow.
      F. Flowers about ½ inch long and broad, with narrow tubular calyx, the white corolla persistent on nutlet and turning brown, crushed leaves with odor of garlic—221. Capá prieto, capa, *Cordia alliodora* (Ruiz & Pav.) Oken.
      FF. Flowers about 3/16 inch long; fruits round white juicy, ¼ inch in diameter—677. *Tournefortia filiflora.*
    EE. Flowers spreading or bell-shaped, with broad 5-lobed corolla; fruit a rounded drupe.
      G. Leaves broadly elliptic to nearly round.
        H. Leaves coarsely toothed, upper surface rough hairy, petioles less than 1 inch long; corolla whitish or pale yellow; fruits elliptic, whitish—671. *Cordia alba.*
        HH. Leaves often with a few wavy teeth; petioles more than 1 inch long; corolla light yellow; fruits light pink, with sticky flesh—673. *Cordia obliqua.*
      GG. Leaves elliptic or ovate; corolla white.
        I. Leaves large, mostly 9–12 inches long, rough hairy on upper surface and soft hairy beneath; flowers 3/16 inch broad; fruit whitish, ⅜ inch in diameter—224. Moral, white manjack, *Cordia sulcata* DC.
        II. Leaves smaller, mostly less than 6 inches long, hairless or nearly so (or slightly hairy beneath); fruit orange red or red.
          J. Leaves thick and leathery, with prominent network of many raised veins; flowers about ¼ inch broad; fruit about ⅜ inch in diameter, broader than long, oblique—222. Muñeco, *Cordia borinquensis* Urban.
          JJ. Leaves thin or slightly thickened, with veins not conspicuous.
            K. Flowers stalkless on forking branches, about ¼ inch wide, with hairy calyx—672. *Cordia collococca.*
            KK. Flowers stalked, about ½ inch wide, with calyx hairless.
              L. Flowers saucer-shaped, with spreading corolla, many in clusters 2–4 inches across and high, the branches forking by 2's; fruit bright red—223. Capá colorado, red manjack, *Cordia nitida* Vahl.
              LL. Flowers bell-shaped, with bell-shaped calyx, many in branching clusters 2–8 inches across and high; fruit orange red—220. Palo de vaca, pigeon-berry, *Bourreria succulenta* Jacq.

670. Roble de guayo — *Bourreria virgata* (Sw.) G. Don

This shrub or small tree of dry areas is distinguished by: (1) small elliptic or obovate leaves mostly ¾–1½ inches long and ¼–½ inch wide, sometimes larger, rough or smooth, slightly thick and stiff and with edges rolled under; (2) tubular flowers ½ inch long and broad across the 5 widely spreading white corolla lobes, few in terminal clusters; and (3) fleshy orange or red rounded fruit about ⅜ inch in diameter, wider than long.

An evergreen shrub or small tree to 30 feet high and 6 inches in trunk diameter, often with several stems from base, reported to become larger. The bark is gray, smoothish to slightly fissured, the inner bark whitish and almost tasteless. The twigs are slender, often short and much branched, green when young and becoming gray. Twigs leaves, and branches of flower clusters vary from hairless to densely hairy.

670. Roble de guayo *Bourreria virgata* (Sw.) G. Don

Flowering twig (left), fruiting twig (right), natural size.

The leaves are alternate but often crowded, the short petioles $\frac{1}{16}$–$\frac{3}{16}$ inch long. Blades are rounded or slightly notched at apex, gradually narrowed to the short-pointed base, the upper surface curved up slightly at sunken midrib, shiny green, rough with short stiff hairs or smooth, the lower surface dull light green with raised network of small veins and commonly hairy.

Flowers few in terminal clusters (cymes), almost stalkless, slightly fragrant. The bell-shaped calyx is $\frac{3}{16}$ inch long, finely hairy, 5-lobed; the tubular white corolla with 5 widely spreading lobes; stamens 5 on corolla tube; and pistil with 2-celled ovary and slender 2-forked style. The fruits (drupes) with calyx at base contain 4 or fewer light brown nutlets. Flowering and fruiting through the year.

The wood is light brown and hard.

Locally common in moist and dry limestone forests and lower Cordillera forest at 100–1,000 feet altitude in western foothills of Puerto Rico. Also in Vieques.

PUBLIC FORESTS.—Cambalache, Guajataca, Guánica, Susúa.

RANGE.—Cuba, Hispaniola, Puerto Rico, and Vieques.

OTHER COMMON NAMES.—palo de vaca (Puerto Rico); guazumilla (Dominican Republic); raspalengua, cafecillo (Cuba).

BOTANICAL SYNONYM.—*Bourreria domingensis* (DC.) Griseb.

As Britton and Wilson (*10*) noted, *Bourreria domingensis,* which has leaves smooth above, perhaps is not distinct from *B. virgata,* which has leaves rough above. Some plants are intermediate. These variations are united here under the older name. The generic name has been spelled also *Beurreria* and *Beureria.*

671. Cereza blanca, white manjack — *Cordia alba* (Jacq.) Roem. & Schult.

This shrub or small tree of thickets and dry forests is distinguished by: (1) broadly elliptic leaves coarsely and irregularly toothed, with upper surface rough hairy; (2) many showy fragrant whitish or pale yellow flowers about $\frac{5}{8}$ inch across the spreading funnel-shaped 5-toothed corolla; and (3) elliptic whitish fleshy fruits $\frac{3}{8}$–$\frac{5}{8}$ inch long.

A deciduous shrub or small tree to 25 feet high and 8 inches in trunk diameter, with broad rounded crown, sometimes vinelike. Bark light gray, very thick, deeply furrowed into narrow ridges, the inner bark light brown and bitter. Twigs slender, brownish, hairy.

The alternate leaves have hairy petioles $\frac{3}{8}$–1 inch long. Blades are 2–5 inches long and $1\frac{1}{2}$–$2\frac{1}{2}$ inches wide, short-pointed at apex and blunt or rounded at base, slightly thickened, the upper surface green and rough, and the lower surface dull light green with hairy veins.

Flower clusters (panicles) terminal, erect, much branched, flattened above, often broader than long and up to 10 inches wide. Flowers almost stalkless, consisting of tubular hairy calyx less than $\frac{1}{4}$ inch long, 10-ribbed, 3–5-toothed, forming cap in bud; whitish funnel-shaped corolla $\frac{1}{2}$ inch long; 5 stamens inserted near base of corolla; and pistil with ovary and 2 styles each 2-forked. The fruit (drupe) with calyx persistent at base contains a stone and whitish pulp, reported to be edible. Flowering and fruiting throughout the year.

The light brown wood is soft, of medium weight, and not durable. Elsewhere it has served for interiors and construction.

Grown around houses for shade and in living fences. Elsewhere the flowers and leaves have served in home remedies. The mucilaginous pulp of the fruits has served as glue. The fruits are a good source of wildlife food, especially for doves and other birds. A honey plant.

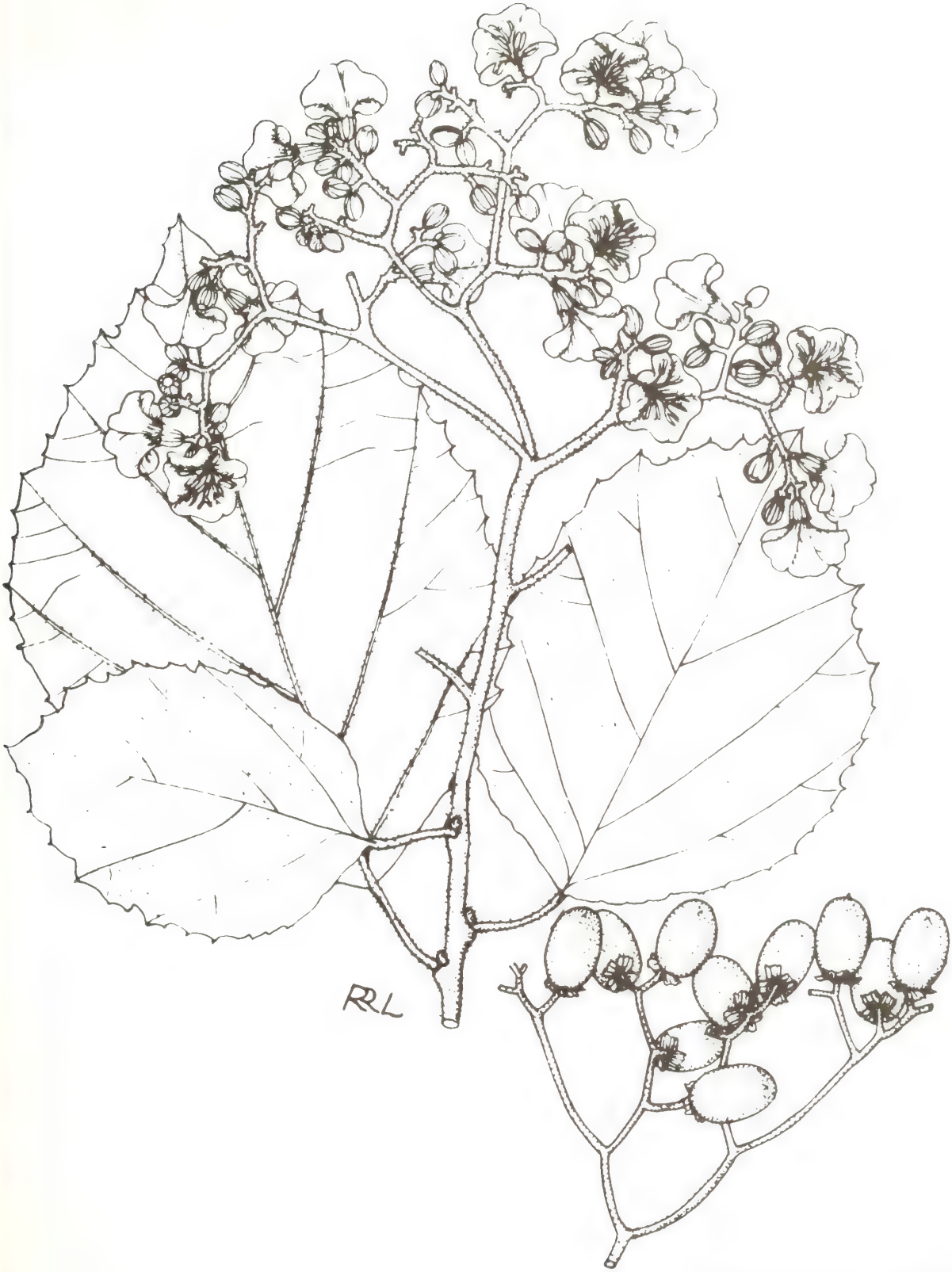
Locally abundant in dry coastal forest from sea level to 500 feet altitude, Culebra, Vieques, St. Croix, Buck Island, St. Thomas, and St. John. Recorded also from dry forests of southwestern Puerto Rico but not seen in Puerto Rico by the authors.

PUBLIC FOREST AND PARKS.—Estate Thomas; Buck Island Reef, Virgin Islands.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, and Lesser Antilles from St. Barts and Antigua to Grenada and Barbados. Also from Mexico to Colombia, Venezuela, and Aruba, Curacao, and Bonaire.

OTHER COMMON NAMES.—capá, capá blanca (Puerto Rico); white manjack (Virgin Islands); yagua, muñeco blanco (Dominican Republic); uva gomosa, ateje amarillo, varía blanca, uvita (Cuba); zazamil, sasanil, gualbere, chirimo (Mexico); chachalaco (Honduras); tigüilote (El Salvador, Nicaragua, Costa Rica); cebito (El Salvador); jigüilote (Costa Rica); uvillo, uvero, goma (Panama); gomo blanco, caujaro, uvito (Colombia); caujaro, cariaco, tarare amarillo, tarare blanco, pardillo blanco, baboso, candilero, grimanso, flor de ángel (Venezuela); dope-cherry, duppy-cherry (Jamaica); clammy-cherry (Grenada); jack-wood (British Honduras); English clammy-cherry, loblolly-tree (Barbados); bois chique (Haiti); mahot blanc (Martinique); cawara, cawara di mondi coara (Dutch Antilles).

BOTANICAL SYNONYMS.—*Cordia dentata* Poir., *Calyptracordia alba* (Jacq.) Britton.



671. Cereza blanca, white manjack *Cordia alba* (Jacq.) Roem. & Schult.

Flowering twig and fruits (lower right), natural size.

672. Cerezo, red manjack ***Cordia collococca* L.**

This common tree at low altitudes is recognized by: (1) shiny elliptic to obovate leaves with edges often wavy, often shed at time of flowering; (2) many small stalkless flowers with 5-lobed cup-shaped white corolla ¼ inch long and wide; and (3) round orange-red fleshy fruits ⅜ inch in diameter.

Small to medium-sized widely spreading deciduous tree to 60 feet high and 1½ feet in trunk diameter, often with horizontal and widely forking branches. Small plants have whorls or rings of horizontal branches. Bark gray, smoothish to finely fissured and rough, the inner bark light brown and almost tasteless. The twigs are green and finely hairy when young, becoming light gray and hairless.

The alternate leaves have leafstalks ¼–2 inches long, without stipules. Blades are mostly 2½–6 inches long and 1¼–2¾ inches wide, slightly thickened and leathery, short-pointed or blunt at apex, pointed or rounded at base, the upper surface very shiny green and nearly hairless, the lower surface light green and slightly hairy with slender bristles along midvein.

The flower clusters (cymose panicles) erect at ends of twigs contain many fragrant stalkless flowers on slender widely forking branches, male and female on different plants (dioecious). The flower consists of cup-shaped hairy green calyx ⅛ inch long, irregularly 3–5-toothed from round bud; cup-shaped corolla with short tube and 5 lobes spreading and bent down; 5 stamens inserted on tube and alternate with lobes, small and nonfunctional in female flowers; and pistil with 4-celled ovary and 2 styles each 2-forked. The mucilaginous sweetish fruits (drupes) are edible but astringent and contain a large 1-seeded stone. Flowering and fruiting in spring and summer.

The wood is whitish brown, soft, and lightweight.

In other areas the fruits are eaten by hogs and chickens and the roots are used in home remedies.

Locally common and widespread in dry coastal forest from sea level to 400 feet altitude in eastern and southern coasts of Puerto Rico. Also, Mona, Piñeros, Culebra, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FOREST AND PARKS.—Guánica; Virgin Islands, Sage Mountain.

RANGE.—Greater Antilles and through Lesser Antilles to Grenada and Barbados. Also southern Mexico to Costa Rica and northern Venezuela.

OTHER COMMON NAMES.—palo de muñeca (Puerto Rico); muñeco, palo de muñeco blanco (Dominican Republic); ateje, ateje hembra (Cuba); manuno, manone (El Salvador); nigüito, buriogre, muñeco (Costa Rica, Colombia); alatrique, caujaro (Venezuela); cherry, wild cherry (Jamaica); clammy-cherry (Grenada); clammy-cherry, wild clammy-cherry (Barbados); sombra de ternero (British Honduras); mapou (St. Barts, Guadeloupe); mapou blanc, mahot rivière (Martinique); trois pieds (Haiti).

BOTANICAL SYNONYM.—*Cordia glabra* auth.

A grove of several trees on Mona Island is the source of the name Bajura de los Cerezos.

672. Cerezo, red manjack *Cordia collococca* L.

Leafy twig with old fruit stalks (left), fruits and flowering twig (lower right), natural size.

673. Cereza blanca, manjack ***Cordia obliqua* Willd.***

This introduced ornamental tree is identified by: (1) broadly ovate or elliptic to nearly round leaves 2–3½ inches long and 1½–4 inches wide, with slender leafstalks 1–1¾ inches long; (2) many flowers ¼ inch long and broad with light yellow 5-lobed corolla, on slender widely forking branches; and (3) many light pink round fruits ½–⅝ inch in diameter, with slightly sweet, sticky edible flesh.

Planted evergreen spreading small tree 25–30 feet high and 8 inches in trunk diameter, perhaps becoming larger. The bark is gray, smoothish to finely fissured or furrowed. The inner bark is light yellow, turning to brown on exposure, almost tasteless. Twigs are green, turning to brown, hairless, with raised light brown dots (lenticels) and raised half-round leaf scars.

The blades of the alternate leaves are slightly thickened and leathery, blunt or rounded at apex, rounded or notched at base, often with a few wavy teeth at border, the upper surface green to dark green, and dull or slightly shiny, and hairless, the lower surface light green with tufts of hairs in vein angles.

The flower clusters (corymbose cymes) at ends of twigs are 2–5 inches broad, forking regularly by 2's. Flowers are composed of cylindric green calyx 3/16 inch long, minutely hairy, 5-toothed; light yellow corolla with short tube and 5 spreading lobes; 5 spreading stamens inserted in tube and alternate with lobes; and pistil with elliptic 4-celled ovary and 4-forked style.

Fruits (drupes) are borne in quantities, causing the weighted branches to droop, turning from whitish green to light pink at maturity. The fruits have enlarged light green cup-like calyx at base, point from style at apex, pinkish, very mucilaginous, juicy and slightly sweet flesh, flattened light brown stone ⅜ inch in diameter, and 1–2 seeds. Flowering and fruiting throughout the year.

Grown as an ornamental for the foliage, flowers, and fruits and as a fence row tree. Elsewhere, the sticky fruit pulp has served as mucilage.

Planted and locally common at low altitudes at the northeast end of Puerto Rico, especially near Fajardo and Mameyes. Also Vieques, St. Croix, St. Thomas, Tortola, and Virgin Gorda. Spreading from cultivation in moist coastal forest and probably will become more common.

RANGE.—Native of India but introduced into the Lesser Antilles perhaps in the 18th century and afterwards into Puerto Rico and the Virgin Islands, Cuba, and other islands.

OTHER COMMON NAMES.—sticking-tree (Tortola); ateje americano, ateje amarillo (Cuba); clammy-cherry (Barbados); manjack, sticky-cherry, palo de goma (The Grenadines).

BOTANICAL SYNONYM. — *Cordia tremula* Griseb.

This species was named in 1861 as a native of Barbados (*Cordia tremula* Griseb.) but later was found to have been introduced from India at an earlier date. The Puerto Rican tree formerly was identified as *C. blancoi* Vidal, of the Philippine Islands.

673. Cereza blanca, manjack

Cordia obliqua Willd.*

Fruiting twig (above), flowering twig (below), natural size.

674. San Bartolomé, manjack ***Cordia rickseckeri* Millsp.**

This uncommon tree with bright orange flowers, native only in the dry forests of Puerto Rico and the Virgin Islands, is characterized by: (1) elliptic or oblong leaves 3½–9 inches long and 2–4 inches wide, usually very rough above like sandpaper, with minute sharp flattened hairs; (2) showy, clustered orange flowers about 1¼ inches long and ⅞–1 inch across the 5 spreading lobes of the funnel-shaped corolla; and (3) the egg-shaped fruits 1 inch or more in length and ¾ inch in diameter, covered by the enlarged calyx, brownish green, becoming yellow or orange. From the closely related introduced ornamental No. 675, vomitel colorado or Geiger-tree, *Cordia sebestena* L.,* this native tree is distinguished by the narrower leaves usually very rough above, with shorter petioles, the smaller flowers with shorter, often hairless calyx, and by the fruits not whitish.

A small deciduous (?) tree to 35 feet high and 14 inches in trunk diameter or sometimes a bushy shrub. The bark is gray, thick, smoothish, slightly fissured, or with deep long furrows. The dead outer bark is gray, and the inner bark yellowish green or light brown and bitter. The twigs are stout and light gray, with stiff hairs when young.

The alternate leaves have stout petioles ¼–1½ inches long, with stiff hairs. Leaf blades are short-pointed or rounded at both ends, usually thickened and stiff with edges turned under, the upper surface dark green and usually very rough though sometimes almost smooth, with lateral veins often reddish tinged and sunken, and the lower surface light green, smoothish and nearly hairless with lateral veins often raised.

Many or several flowers are borne in short spreading branched terminal clusters (cymes) about 2½–4 inches broad at the end of leafless twigs. The flower has an oblong tubular orange calyx nearly ½ inch long, hairless, slightly fleshy, ending in 3–5 short teeth; corolla funnel-shaped, 1¼ inches long, orange or orange red, finely hairy outside, with many long ridges, ending in 5 (sometimes 6) spreading rounded wavy-margined lobes; 5 stamens ⅜ inch long inserted in throat of corolla tube; and pistil about 1 inch long, composed of short conic ovary of 4 cells and 4 ovules and threadlike style 4-forked at end.

The fruit (drupe) is covered by the enlarged calyx, often has the threadlike remains of style at apex, has thin pulp and large, very thick-walled stone enclosing 1–4 whitish elliptic seeds nearly ½ inch long. Flowering and fruiting through the year.

The sapwood is whitish or light brown and hard.

Locally common in dry and moist coastal forests from sea level to 700 feet altitude on eastern and southern coasts of Puerto Rico. Also Palominos, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC FOREST AND PARKS.—Guánica; Buck Island Reef, Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands.

OTHER COMMON NAMES.—lija (Puerto Rico); manjack (Jost Van Dyke); dog almond, black manjack (Tortola).

BOTANICAL SYNONYM.—*Sebesten rickseckeri* (Millsp.) Britton.

This species honors Alfred Edmund Ricksecker (born 1869), college science professor from the United States, who with relatives made large plant collections in St. Croix in 1895–1896. A closely related species (*Cordia fitchii* Urban) is found in Hispaniola (Dominican Republic).

674. San Bartolomé, manjack *Cordia ricksecker*i Millsp.

Flowering twig (left), fruits (lower right), natural size.

675. Vomitel colorado, Geiger-tree ***Cordia sebestena* L.***

This uncommon ornamental is easily recognized by the showy clusters of many funnel-shaped orange or red flowers nearly 1½ inches long and broad, with usually 5 or 6 spreading rounded lobes. Other characters are: (1) the ovate leaves 3½–8 inches long and 2½–5½ inches wide, slightly rough hairy above; and (2) the egg-shaped hard fruits 1–1½ inches long and ¾ inch broad, covered by the enlarged whitish calyx.

A small deciduous or evergreen tree to 20 feet high and 6 inches in trunk diameter, with compact rounded crown. The bark is thick, dark brown and scaly, deeply furrowed into narrow scaly ridges. The stout twigs are green and covered with rusty hairs, becoming gray.

The stout petioles of the alternate leaves are 1–2 inches long. Blades are short-pointed at apex, rounded or slightly heart-shaped at base, sometimes with a few teeth, slightly thick and stiff, the upper surface dark green and slightly rough with stiff hairs and the lower surface paler and usually hairy, especially along the raised lateral veins.

The flower clusters (cymes) are terminal, branched, and flattened, about 6 inches across the many crowded flowers. Each flower is composed of the narrow oblong tubular calyx more than ⅝ inch long, densely hairy, ending in 3–5 short teeth; the funnel-chaped orange or red corolla finely hairy outside, with many long ridges, ending in usually 5 or 6 spreading rounded wavy-margined lobes 1–1½ inches across; stamens 5 or 6, ¼ inch or more in length inserted in throat of corolla tube and alternate with the lobes; and pistil about 1¼ inches long, composed of short conic ovary of 4 cells and 4 ovules and threadlike style 4-forked at end.

The fruit (drupe) is covered by the white enlarged calyx, often has the threadlike remains of style at apex, has thin pulp and large, grooved, very thick-walled stone containing 1–4 white seeds ½ inch long. Flowering and fruiting throughout the year.

The thick sapwood is light brown and the heartwood dark brown. The wood is hard, heavy (specific gravity 0.7), fine-textured, and has been used elsewhere in carpentry.

Uncommon as a planted ornamental about homes and along roadsides, especially in the drier parts of Puerto Rico and the Virgin Islands. Propagated from seeds and cuttings and of slow growth. Escaping from cultivation and naturalized on the south coast but not native here.

This is a popular ornamental in the American tropics, hardy in dry areas and poor soils and salt-tolerant. Recommended for south Florida and grown also in southern Arizona. It is reported that the fruits are both medicinal and edible.

RANGE.—Southern Florida, including Florida Keys, through West Indies, and from southern Mexico south to Colombia and Venezuela in northern South America. The range has been extended through cultivation, also to the Old World tropics.

OTHER COMMON NAMES.—anaconda, cereza amarilla, San Bartolomé (Puerto Rico); avellano criollo (Dominican Republic); vomitel colorado, anacagüita (Cuba); anacahuita (Mexico); siricote (Mexico, Guatemala); San Joaquín (Colombia); Joaquín, no-me-olvides (Venezuela); scarlet cordia (Barbados); red cordia, scarlet cordia (Jamaica); coquelicot, petit soleil (Haiti); scarlet accordia, scarlet flower, cawara spaño, manhage (Dutch Antilles); Gieger-tree (United States).

BOTANICAL SYNONYM.—*Sebesten sebestena* (L.) Britton.

The English common name Geiger-tree honors John Geiger, a ship pilot of the early 19th century, who first planted this tree at Key West, Florida.

675. Vomitel colorado, Geiger-tree *Cordia sebestena* L.*

Flowers (upper left), fruits (lower left), and leaf (right), natural size.

676. Juso ***Rochefortia acanthophora*** **(DC.) Griseb.**

This much-branched spiny shrub or small tree of dry areas is recognized by: (1) the zigzag gray twigs with a slender straight spine ¼ inch or more in length at each node; (2) the very small obovate leaves ⅜–½ inch long and ⅛–3/16 inch wide, clustered on very short lateral twigs; (3) few greenish flowers more than 1/16 inch long clustered at leaf bases; and (4) round, yellowish to red fruit less than ¼ inch in diameter.

A deciduous shrub 6–10 feet high or rarely small tree becoming 15 feet high and with several trunks to 3 inches in diameter, with thin crown of many branches and very small leaves. The bark is gray and smoothish. Twigs are gray, hairless, becoming fissured, with a slender straight sharp spine at each node and with a very short twig less than ⅛ inch long above a spine.

The leaves are alternate but often several together on the very short twigs, almost stalkless. Blades are sometimes to ¾ inch long and ½ inch wide, rounded at apex, gradually narrowed at base into slender petiole less than 1/16 inch long, turned under at edges, slightly thick, stiff, and leathery, minutely hairy, the upper surface green and shiny, the lower surface dull light green.

A few stalkless flowers are clustered at leaf bases on short twigs. The flower is composed of calyx of 5 round green hairy sepals 1/16 inch long; corolla of 5 light yellow rounded concave petals less than 1/16 inch long, slightly united at base; 5 stamens attached near base of corolla and alternate with the lobes; and yellowish pistil with conical 2-celled ovary and 2 hairy styles. The fruit is a round yellowish drupe less than ¼ inch in diameter, with calyx at base, fleshy and containing 4 hard nutlets. Flowering and fruiting in spring and summer.

The wood is hard, the sapwood light brown and the heartwood dark brown. Used elsewhere in cabinetmaking.

Locally common in dry coastal, dry limestone, and lower Cordillera forests from sea level to 600 feet altitude in southwestern Puerto Rico. Also Desecheo and islands eastward, St. Thomas, St. John, St. Croix, and Virgin Gorda.

PUBLIC FORESTS AND PARK.—Guánica, Susúa; Buck Island Reef.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, St. Martin, St. Eustatius, and Antigua.

OTHER COMMON NAMES.—corazón de paloma, ébano, trejo (Dominican Republic); espuela de caballero (Cuba); ébène bois d'ébène (Haiti).

676. Juso *Rochefortia acanthophora* (DC.) Griseb.

Leafy twig (left), flowering twig (center), fruiting twig (right), natural size.

677. Nigua ***Tournefortia filiflora* Griseb.**

This rare shrub, sometimes a small tree, is identified by: (1) twigs angled, green and stout; (2) large elliptic thin hairless leaves; (3) many small white 5-parted flowers about $\frac{3}{16}$ inch long, stalkless on top side of spreading nearly horizontal forks of long-stalked clusters; and (4) round white juicy fruits $\frac{1}{4}$ inch in diameter.

Evergreen shrub or small spreading tree to 20 feet high and 4 inches in trunk diameter. Bark dark gray, finely fissured. Inner bark light brown, bitter. The twigs are finely hairy when young.

The alternate leaves have stout green leafstalks to 2 inches long. Blades are 4–17 inches long and $1\frac{1}{2}$–7 inches wide, short-pointed or long-pointed at both ends, not toothed on edges, the upper surface green and slightly shiny with side veins slightly sunken, the lower surface dull light green.

The large flower clusters (cymes) have several horizontal and curved slender branches 1–$2\frac{1}{2}$ inches long at the end of a long stalk as much as 6 inches long, the branches finely hairy. The flowers have green 5-toothed hairy calyx about $\frac{1}{16}$ inch long; white hairy corolla $\frac{3}{16}$ inch long with very narrow tube and 5 lobes; 5 stamens inserted within tube and alternate with lobes; and pistil with 4-celled ovary and 2-lobed style. The fruits (drupes) have calyx at base and contain 2 brown nutlets. Collected with flowers in December and April, with fruits from March to August.

The wood is whitish, soft, and brittle.

Rare in moist limestone forest at 100–800 feet altitude in northwestern foothills of Puerto Rico. Reported long ago from St. Croix, St. Thomas, and St. John but not found in Virgin Islands in recent years.

PUBLIC FORESTS.—Guajataca, Río Abajo.

RANGE.—Puerto Rico. Also Lesser Antilles from St. Martin, Saba, and St. Eustatius to St. Vincent.

677. Nigua

Tournefortia filiflora Griseb.

Flowers (upper right) and fruiting twig, two-thirds natural size.

VERBENA FAMILY (VERBENACEAE)

Herbs, shrubs, woody vines, and trees often large, known by: (1) twigs often 4-angled; (2) leaves opposite (sometimes whorled), generally simple (palmately compound or with 3 or fewer leaflets in *Vitex*), often deciduous without stipules; (3) flowers mostly small, often colored, commonly in cymes, racemes, or spikes, bisexual, usually irregular, with calyx mostly 5-lobed or 5-toothed, corolla with short tube and 5 short unequal spreading lobes or in 2 lips, stamens usually 4 in pairs and sometimes 1 staminode inserted in tube, and pistil with superior ovary of 2 or 4 cells each containing 1 ovule, long style, and 1–2 stigmas; and (4) fruit generally a drupe with 2–4 nutlets or only 2–4 nutlets (capsule in blackmangrove, *Avicennia*). Also vol. 1, p. 476.

Key to species

A. Leaves compound.
  B. Leaves digitate (palmately compound) with 5–7 narrowly lanceolate leaflets.—685. *Vitex agnus-castus.**
  BB. Leaves with 3 elliptic leaflets, often only 1 or sometimes 2, the end one largest—230. Higüerillo, white fiddlewood, *Vitex divaricata* Sw.
AA. Leaves simple.
  C. Twigs often spiny, long, slender, and often vinelike.
    D. Spines slender, straight, 1–2 at a node; flowers light blue; fruits yellowish.—684. *Duranta repens.*
    DD. Spines stout, curved, 2–3 at a node; flowers white; fruits blackish.—681. *Clerodendrum aculeatum.*
  CC. Twigs not spiny, erect, not vinelike.
    E. Leaves very large, elliptic, 12–15 inches or more in length, thick, leathery, and harsh.—229. Teca, teak, *Tectona grandis* L. f.*
    EE. Leaves less than 8 inches long.
      F. Leaves hairless or nearly so (velvety hairy beneath in a variety of No. 227).
        G. Leaves elliptic, long-pointed; flower clusters branched (cymes in panicles).—678. *Aegiphila martinicensis.*
        GG. Leaves elliptic to oblong, short- to long-pointed; flower clusters not branched (racemes). —*Citharexylum.*
          H. Leaves with few side veins, mostly blunt at apex, dull green, not forming prominent network when dry; flower stalks about 1/16 inch long.—226. Péndula de sierra, *Citharexylum caudatum* L.
          HH. Leaves with prominent network of small veins when dry.
            I. Leaves shiny yellow green, turning red before falling, sometimes hairy on veins beneath, petiole pink or orange; flowers almost stalkless.—227. Péndula, pasture fiddlewood, Florida fiddlewood, *Citharexylum fruticosum* L.
            II. Leaves green, with tufts of hairs in vein angles beneath; flowers with stalks 1/16–1/8 inch long.—680. *Citharexylum spinosum.*
      FF. Leaves hairy, white, gray, or yellow green on lower surface (often hairless in No. 225).
        J. Leaves lance-shaped or narrowly elliptic, 2–4½ inches long; tree of mangrove swamp forest. —225. Mangle prieto, black-mangrove, *Avicennia germinans* (L.) L. (*A. nitida*).
        JJ. Leaves mostly elliptic, larger; upland trees.
          K. Petioles long, 1–2½ inches long, leaf blades rough, lower surface pale yellow green, with minute hairs and scales and prominent veins.—228. Capá blanco, *Petitia domingensis* Jacq.
          KK. Petioles mostly short, mostly less than 1 inch long.
            L. Leaves shiny above, long- or short-pointed at both ends; flowers white.—679. *Callicarpa ampla.*
            LL. Leaves dull above, not long-pointed; flowers purplish.
              M. Leaves obovate, broadest toward blunt or rounded apex.—682. *Cornutia obovata.*
              MM. Leaves ovate to elliptic, broadest below middle, short-pointed at apex.—683. *Cornutia pyramidata.**

678. Capaillo — *Aegiphila martinicensis* Jacq.

Capaillo, a rare shrub but sometimes a small tree, is identified by: (1) opposite oblong to elliptic thin hairless leaves 3–8 inches long; (2) the mostly terminal flower clusters bearing many small regular flowers 1/4–3/8 inch long with tubular 4-lobed white or pale yellow corolla; and (3) orange, yellow, or red rounded fleshy fruits nearly 3/8 inch in diameter, with irregularly split enlarged calyx at base and containing 1–4 nutlets.

An evergreen shrub 3–10 feet high or sometimes a slender tree to 20 feet high and 3 inches in trunk diameter. Young twigs 4-angled, finely hairy.

Leaves opposite, with slender petioles 1/4–5/8 inch long. Blades 3–8 inches long and 1–3

678. Capaillo

Aegiphila martinicensis Jacq.

Fruiting twig (above), flowers (lower right), natural size.

inches wide, long-pointed at apex and short-pointed or rounded at base, thin, hairless, paler beneath.

Flower clusters (cymes grouped in panicles) 2–6 inches long are mostly terminal but sometimes also lateral, the branches finely hairy. The flower has a very slender stalk about 1/8 inch long; calyx green, bell-shaped, or more than 1/16 inch long, with nearly straight border; corolla about 1/4–3/8 inch long, tubular, deeply 4-lobed; stamens 4, equal, inserted in tube and extending 1/8 inch; and pistil with ovary incompletely 4-celled and 4 ovules, slender style, and 2 threadlike stigma lobes. The fruits (drupes) have irregularly split enlarged calyx at base and contain 1–4 nutlets, each with 1 seed 3/16 inch long. Flowering and fruiting irregularly through the year.

Rare in moist limestone and lower Luquillo forests at 200–800 feet altitude in northern and northeastern foothills of Puerto Rico. Also in St. Croix and St. Thomas.

PUBLIC FORESTS.—Cambalache, Guajataca, Luquillo.

RANGE.—Cuba, Jamaica, Cayman Islands, Puerto Rico and Virgin Islands, and through Lesser Antilles from St. Eustatius to Grenada, Barbados, and Trinidad. Also rare on continent in Panama, Colombia, Venezuela, and French Guiana.

OTHER COMMON NAMES.—spiritweed (Barbados); bois cabrit (Guadeloupe, Martinique, Dominica); bois de fer, sureau gros (Guadeloupe).

679. Capá rosa — *Callicarpa ampla* Schauer

Capá rosa is a rare shrub or medium-sized tree known only from wet forests of Puerto Rico. It is characterized by: (1) twigs, lower leaf surfaces, and branches of flower clusters densely white scurfy; (2) leaves opposite, elliptic to oblong-elliptic, 4–10 inches long and 1½–3 inches wide; (3) many small flowers with white 4-lobed corolla about 1/8 inch long, in lateral clusters; and (4) rounded fruits nearly 1/4 inch in diameter, with calyx at base.

An evergreen shrub 10 feet high or recorded as a tree 20–50 feet high. Young twigs 4-angled. The opposite leaves have stout petioles ½–1¼ inches long. Blades are long- or short-pointed at both ends, straight or finely wavy-toothed on edges, slightly thickened, the upper surface shiny green and hairless, with long curved side veins, and the lower surface densely white scurfy with prominent network of raised veins.

Flower clusters (cymes) are large, long-stalked, spreading and flat-topped. The nearly stalkless flowers have a short bell-shaped whitish calyx about 1/16 inch long, slightly 4-toothed; white corolla with short tube and 4 equal lobes; 4 stamens much longer than corolla, and pistil. The fruits (drupes) change color from white to pink to pale purple at maturity. Collected with flowers from January to June and with fruits in September–October.

Rare in wet forests in mountains of Puerto Rico from Luquillo to near Cayey and Utuado.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Puerto Rico. Recorded long ago from St. Thomas.

OTHER COMMON NAME.—péndula cimarrona (Puerto Rico).

679. Capá rosa

Callicarpa ampla Schauer

Fruiting twig (above), flowers (lower right), two-thirds natural size.

680. Susanna ***Citharexylum spinosum* L.**

This tree is recorded as wild and planted in St. Croix, St. Thomas, and Puerto Rico. It is distinguished by: (1) twigs 4-angled, hairless (not spiny); (2) opposite elliptic to oblong leaves mostly large and thin, densely net-veined when dry; (3) long narrow clusters of small white flowers nearly 3/8 inch across the 5 slightly unequal corolla lobes, on stalks 1/16–1/8 inch long; and (4) elliptic shiny black fruits 3/8 inch long.

An evergreen medium-sized tree, reported to reach 65 feet in height, not spiny, as the scientific name erroneously suggests. The opposite leaves have slender petioles 3/8–1 inch long. The blades are 2 1/2–8 inches long and 3/4–4 inches wide, long-pointed, short-pointed, or blunt at apex and short-pointed at base, not toothed on edges (except rarely on young shoots), hairless on upper surface, the lower surface with tufts of hairs in vein angles.

Flower clusters (racemes) terminal or lateral, to 1 foot long, narrow and drooping. Flowers many, fragrant, the cup-shaped calyx more than 1/8 inch long, hairless and slightly 5-toothed; corolla white, with tube 1/4 inch long, hairy at throat; 4 stamens in pairs inserted in corolla tube; and pistil with 4-celled ovary, style, and 2-lobed stigma. The fruits (drupes) are red when immature, turning black, have enlarged cup-shaped calyx at base, and contain 2 nutlets, each 2-seeded.

Recorded from forests in St. Croix, St. Thomas, and Puerto Rico but very rare. Planted for ornament and shade there and elsewhere in the tropics and indoors northward. Not collected by the authors.

RANGE.—St. Croix, St. Thomas, Lesser Antilles from Saba to Barbados, Trinidad and Tobago. Also Venezuela to French Guiana. The range extended by planting and escaping through the West Indies to Cuba and Jamaica and north to Bermuda, also California, Hawaii, and the Old World tropics.

OTHER COMMON NAMES.—susanna (Virgin Islands); fiddlewood (Virgin Islands, English); côtelette (Grenada); bois côtelette (Dominica, Martinique, St. Lucia); bois guitare, bois de fer blanc (Guadeloupe); susanna-berry (Dutch Antilles).

An apparent natural hybrid with No. 226, péndula de sierra, *Citharexylum caudatum* L., having intermediate characters (*C. perkinsii* Moldenke), has been found in Cerro de Punta, Puerto Rico.

Excluded species: *Citharexylum tristachyum* Turcz. This species of Cuba and Jamaica, not listed by Britton and Wilson (*10*), has been recorded from St. Thomas on the basis of a very old specimen. A small tree to 16 feet high, identified by: (1) twigs 4-angled, hairless; (2) opposite, elliptic to oblong leaves 2–5 inches long, long-pointed at apex, short-pointed at base, not toothed on edges, the upper surface hairless or nearly so, the lower surface with hairs in vein angles, the petiole without glands; (3) long narrow clusters of almost stalkless small yellow flowers about 1/4 inch long, the calyx 5-toothed, the corolla tubular with 5 slightly unequal lobes, on stalks 1/16 inch long; and (4) fruits (drupes) rounded, black, 3/16 inch in diameter, with cuplike calyx at base, the stone 2-celled.

680. Susanna

Citharexylum spinosum L.

Flowering twig (above), fruiting twig (below), natural size.

681. Escambrón blanco, haggarbush ***Clerodendrum aculeatum*** **(L.) Schlecht.**

This vinelike spiny climbing shrub sometimes becomes treelike. It is distinguished by: (1) the long slender twigs with 2 or 3 curved spines at each node; (2) the elliptic leaves 1–2 inches long and ⅜–1 inch broad, paired or 3 at a node; (3) the clustered flowers about ¾ inch long, with white corolla in very narrow tube with 5 short lobes; and (4) fruits blackish, juicy, ¼–⅜ inch in diameter.

Usually a shrub with vinelike branches climbing on trees, to 30 feet long and 1 inch in diameter, sometimes treelike and to 20 feet high and 6 inches in trunk diameter. Bark light gray, thick, rough, furrowed. The slender light brown twigs are covered with minute hairs and bear 2 or 3 stout sharp curved spines ⅛–¼ inch long at each node, the spine from the basal part of the petiole.

The leaves are opposite or sometimes whorled, attached on the upper side of a spine near the tip, and have slender petioles less than ¼ inch long. Blades are rounded or short-pointed at apex, short-pointed at base, not toothed on edges, thin, hairless, covered with minute translucent dots, the upper surface dull green, and the lower surface dull light green.

Flower clusters (cymes) are terminal and lateral, 1–2 inches across, consisting of several slightly fragrant flowers on slender branched stalks. The slightly irregular flower is composed of bell-shaped calyx ⅛ inch long, green, hairy, 5-lobed; the white corolla with very narrow tube about ⅝ inch long and 5 elliptic spreading lobes ¼ inch long; 4 threadlike whitish to purplish stamens about ¾ inch long in unequal pairs, attached inside tube and widely spreading; and pistil with minute ovary, threadlike purplish style about 1¼ inches long, and 2-forked stigma. The fruit (drupe) is shiny black, slightly broader than long, 4-grooved, slightly juicy, and contains 4 brown nutlets less than ¼ inch long, united in pairs. With flowers and fruits throughout the year.

Sometimes grown as a hedge plant and climbing on walls at St. Thomas and elsewhere. It is reported that a poultice in home remedies is made from the leaves. This species is host of one of the largest leafhopper insects in Puerto Rico (*Gypona portoricensis* Caldwell).

Locally common in moist and dry coastal thickets and forests and tidal areas near sea level in Puerto Rico from Fajardo to Cabo Rojo. Also, islands eastward, including Icacos, Piñeros, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost Van Dyke, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Aguirre, Guánica; Buck Island Reef, Virgin Islands.

RANGE.—West Indies from Bahamas through Greater Antilles and Lesser Antilles from St. Martin and St. Barts south to St. Lucia and Barbados. Planted in Trinidad and Tobago and naturalized in Bermuda. Also Veracruz, Mexico, and along the coast from Venezuela to French Guiana. Introduced in Hawaii. Widely grown in tropical regions as a hedge plant and sand-dune binder along seashores.

OTHER COMMON NAMES.—botón de oro, descamisador (Puerto Rico); haggarbush (Jost Van Dyke); uña de gato, corazón de paloma (Dominican Republic); prickly-myrtle, crab-prickle (English); privet (Tortola, St. Vincent); prickly wild-coffee, coffee-fence (Barbados); privi-fence (The Grenadines); hague-bush (Dutch Antilles).

BOTANICAL SYNONYM.—*Volkameria aculeata* L.

681. Escambrón blanco, haggarbush

Clerodendrum aculeatum (L.) Schlecht.

Natural size.

682. Nigua ***Cornutia obovata* Urban**

This rare small tree known only from Puerto Rico is recognized by: (1) the 4-angled twigs, branches of flower clusters, flowers, and lower leaf surfaces minutely hairy; (2) opposite obovate leaves blunt or rounded at apex, the lower surface light green with a coat of fine hairs; (3) many flowers 5/8 inch long, with purplish corolla tubular and irregularly 4-lobed, in showy erect narrow clusters; and (4) rounded finely hairy fruits 3/16 inch long, with calyx at base.

A small evergreen tree 25 feet high and 5 inches in trunk diameter, recorded to 33 feet in height. Bark light gray, rough with many long fissures, the inner bark light brown, slightly fibrous, and almost tasteless. Twigs 4-angled, light brown, minutely hairy.

The opposite leaves have petioles 3/8–3/4 inch long. Blades are obovate, 2 1/2–6 inches long and 1 1/2–4 inches wide, blunt or rounded at apex, short-pointed at base, edges slightly turned under, slightly thickened, the upper surface green and becoming hairless, and the lower surface light green with a coat of fine hairs.

Flower clusters (panicled cymes) are erect, terminal, and narrow, 3–10 inches long, only 1 1/2–2 inches wide. Flowers have stalks about 1/16 inch long; calyx bell-shaped, less than 1/8 inch long, 4-lobed, finely hairy; corolla purplish, finely hairy, tubular and 4-lobed, the lowest lobe largest and with yellow spot at base inside; stamens 2 and 2 sterile (staminodes) on corolla; and pistil with 4-celled hairy ovary and 2-lobed style. Fruits (drupes) recorded as violet are finely hairy, have enlarged calyx at base, and contain a 3–4-celled stone with 4 or fewer seeds. Collected with flowers from June to August, with fruits in September–October.

The wood is light brown and hard.

These purple-flowered plants might make attractive ornamentals.

Rare and local in moist limestone and Cordillera forests at 1,000–3,000 feet altitude in central mountains of Puerto Rico. Discovered by Sintenis in 1885 on Monte Torrecillo near Barranquitas and found there afterwards by one of the authors. Rediscovered in 1938 at Río Abajo Forest and near San Sebastian. One tree was found in Guajataca Forest in 1940 and later years.

PUBLIC FORESTS.—Guajataca, Río Abajo.

RANGE.—Known only from Puerto Rico.

OTHER COMMON NAMES.—palo de nigua, capá jigüerilla (Puerto Rico).

This species known only from Puerto Rico is related to No. 683, *Cornutia pyramidata* L., widespread but also rare in Puerto Rico and mentioned here. That species differs in having ovate short- to long-pointed leaves less hairy beneath, and smaller flowers with calyx scarcely lobed.

683. ***Cornutia pyramidata* L.**

A very rare shrub or small tree to 15 feet high and 3 inches in trunk diameter, with light gray furrowed bark. It is identified by: (1) the 4-angled twigs, branches of flower clusters, flowers, and lower surfaces of leaves with fine dense white hairs; (2) opposite, ovate to elliptic leaves 1 1/2–4 1/2 inches long, short-pointed at both ends, thin, with petioles less than 5/8 inch long; (3) flowers about 5/16 inch long, with blue-purple corolla tubular and irregularly 4-lobed, in terminal clusters often long, with slender branches; and (4) finely hairy fruits (drupes) about 1/8 inch in diameter. Collected in Luquillo Mountains with flowers in June 1881 and found afterwards by one of the authors in Barceloneta. Indians elsewhere obtained a blue-black dye from the fruits.

RANGE.—Cuba, Hispaniola, Puerto Rico, Lesser Antilles from Guadeloupe to Grenada; also Mexico, Guatemala, and British Honduras to Nicaragua.

OTHER COMMON NAMES.—azulejo, palo de vidrio (Dominican Republic); salvilla (Cuba); pangoge (Mexico); flor lila (Guatemala); hoja de zope (Guatemala, Honduras); zapilote (El Salvador); zapilote morado (Nicaragua); tzultesnuk, matasano (British Honduras); bois coral (Martinique); bos cassave (St. Lucia, Dominica); bois pou-poule (Grenada).

682. Nigua

Cornutia obovata Urban

Fruits (upper left), flowering twig (right), natural size.

684. Cuenta de oro, skyflower ***Duranta repens* L.**

This shrubby species, which sometimes is vinelike or a small tree, grows wild in dry or open areas and is planted as an ornamental for its showy light blue flowers and many yellowish fruits. Recognized by: (1) the long, slender, unbranched, gray twigs, often with slender straight gray spines paired or single at nodes; (2) paired small elliptic leaves mostly 3/8–1 inch long and 1/4–1/2 inch wide, often with few shallow teeth toward rounded or short-pointed apex; (3) many small light blue irregular tubular flowers 3/8 inch long; and (4) many elliptic or rounded yellow fruits nearly 1/2 inch long.

Evergreen shrub with many stems, or vinelike or sometimes a small tree to 15 feet high and 3 inches in trunk diameter. The bark is light gray, becoming rough and fissured. Inner bark is light gray and slightly bitter.

The opposite leaves have short finely hairy leafstalks 1/16 inch long. Blades are sometimes 1 1/2 inches long, and 7/8 inch wide, short-pointed at base, hairless, thin, with few veins, dull light green on both surfaces.

The flowers are short-stalked in narrow curving unbranched clusters (racemes) 2–6 inches long at ends or sides of twigs. The flower about 3/8 inch long is composed of tubular 5-toothed calyx; light blue corolla with cylindric tube and 5 unequal spreading lobes 3/8 inch across; 4 stamens in pairs inside corolla tube; and pistil with ovary partly 8-celled, short style, and enlarged stigma.

The fruits (drupes) are covered by the yellow calyx with slightly 5-lobed point at apex. Inside the thin yellow bitter flesh is an elliptic yellow stone or 4 nutlets. Flowering and fruiting mostly in spring and summer.

The wood is light brown and hard.

Often planted as an ornamental shrub and spreading from cultivation, such as along roadsides. Propagated by seeds and cuttings. Elsewhere the leaves have served in home remedies. It is reported that the fruits are poisonous to humans.

Uncommon and scattered in dry limestone forest from sea level to 400 feet altitude on coastal hills of southwestern Puerto Rico and islands eastward, including Desecheo, Muertos, Palominos, and Vieques. Also St. Croix and Buck Island Reef, St. Thomas, St. John, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Guánica, Estate Thomas; Buck Island Reef, Virgin Islands.

RANGE.—Widespread through tropical and subtropical America from Bermuda, West Indies, and southern Florida and Mexico south to Argentina, the range extended by cultivation. Grown for ornament also in southern Texas and southern California and in the Old World and escaping from cultivation.

OTHER COMMON NAMES.—azota-caballo, lila, lluvia (Puerto Rico); garbancillo, adonis (Spanish); fruta de paloma (Dominican Republic); no-me-olvides, violetina, fruta de iguana, celosa (Cuba); espina blanca, capocoche (Mexico); heliotropio, chulada (El Salvador); heliotropo morado, pensamiento (Nicaragua); varita de San José, lora (Panama); espino negro, adonis morado (Colombia); fruta de paloma, melero (Venezuela); pigeon-berry (English); golden-dewdrop, skyflower (United States); angels-whisper, poison macca (Jamaica); vanilla (St. Barts); adonis, Persian lilac (Dutch Antilles); grão de galo (Brazil); bois jambette, maïs bouilli (Haiti).

BOTANICAL SYNONYMS.—*Duranta erecta* L., *D. plumieri* Jacq.

685. Sauzgatillo, chaste-tree ***Vitex agnus-castus* L.***

This tall shrub or small tree to 25 feet high and 4 inches in trunk diameter is planted for ornament in gardens of Puerto Rico and the Virgin Islands (St. Croix, St. Thomas). It is recognized by: (1) strong spicy odor of sage; (2) twigs 4-angled; (3) opposite palmately compound (digitate) leaves 3–5 inches long, composed of petiole of 1–2 inches and 5–7 narrowly lanceolate thin leaflets 1–4 inches long and 3/16–3/4 inch wide, very long-pointed at apex, long-pointed and almost stalkless at base, dull green and hairless above, and beneath whitish green and covered with minute hairs; (4) many fragrant small flowers about 3/8 inch long, crowded and nearly stalkless in erect terminal cylindric clusters (panicled spikes) to 6 inches long, composed of bell-shaped white hairy 5-toothed calyx, pale blue tubular hairy corolla irregularly 2-lipped and 5-lobed, 4 stamens attached within tube but protruding, and pistil with 4-celled ovary and protruding 2-forked style; and (5) fruits (drupes) rounded, 1/8 inch long, with calyx at base, containing a large stone. Flowering and fruiting throughout the year. Elsewhere the fruits and seeds have been used in home remedies, and the fragrant leaves as a spice. Native of Mediterranean region from southern Europe and Morocco to western Asia including Turkey, Iraq, and Pakistan, but widely planted for

684. Cuenta de oro, skyflower

Duranta repens L.

Natural size.

ornament and escaping from cultivation and naturalized in tropical and subtropical regions including West Indies. Also southeastern United States from Florida to Texas and California and north to New York City and beyond, where the plants are killed to the ground in winter.

OTHER COMMON NAMES.—chencherenche, palo santo (Puerto Rico); incienso japonés (Cuba); malagueta (Dominican Republic); chaste-tree, hemp-tree, monks peppertree, sage-tree (English); mala di suerte, yerba Louisa (Dutch Antilles).

NIGHTSHADE FAMILY (SOLANACEAE)

Herbs, shrubs, vines, and sometimes trees mostly small, known by: (1) leaves alternate mostly simple, sometimes lobed, often with star-shaped hairs, without stipules; (2) flowers in cymes, bisexual, regular, with 5-lobed persistent calyx, corolla tubular with 5 lobes often spreading and star-shaped, 5 stamens inserted on corolla alternate with lobes, disk generally present, and pistil with superior ovary usually 2-celled with axial placentation and many ovules, style, and 2-lobed stigma; and (3) fruit a berry or capsule with many seeds. Also vol. 1, p. 488.

Key to species

A. Flowers with corolla widely spreading and star-shaped, white or bluish.—*Solanum.*
  B. Twigs with spines or prickles.
    C. Leaves with border lobed or wavy, ovate to elliptic.—699. *Solanum torvum.*
    CC. Leaves with border straight, not toothed or lobed.
      D. Leaves oblong to ovate, 1¼–6 inches long, short-pointed.—698. *Solanum polygamum.*
      DD. Leaves narrowly oblong to lanceolate, 3–8 inches long, long-pointed.—696. *Solanum drymophilum.*
  BB. Twigs not spiny.
    E. Leaves opposite but very unequal, elliptic, hairless or nearly so.—695. *Solanum antillarum.*
    EE. Leaves alternate, with minute star-shaped hairs.
      F. Leaves slightly rough, with hairs inconspicuous.—231. Tabacón, *Solanum rugosum* Dunal.
      FF. Leaves soft hairy, the under surface whitish with dense star-shaped hairs.—697. *Solanum erianthum.*
AA. Flowers with corolla in narrow tube, mostly funnel-shaped.
  G. Flowers with 6-lobed orange corolla, nearly 1 inch long.—694. *Goetzea elegans.*
  GG. Flowers with 5-lobed corolla, white or yellowish.
    H. Flowers less than 1 inch long, several to many along sides of twigs.
      I. Flowers with bell-shaped corolla ⅜ inch long, mostly back of leaves.—686. *Acnistus arborescens.*
      II. Flowers with very narrow funnel-shaped or salverform corolla.
        J. Flowers few, ½ inch long, short-stalked at leaf bases and back of leaves.—692. *Cestrum macrophyllum.*
        JJ. Flowers several to many at end of long stalk.
          K. Flowers ½–⅝ inch long in clusters about as long as the short-pointed leaves; berries purplish black.—691. *Cestrum diurnum.**
          KK. Flowers about 1 inch long in large clusters longer than the long-pointed leaves; berries white.—693. *Cestrum nocturnum.**
    HH. Flowers 2 or more inches long, single or sometimes few, mostly at ends of twigs.—*Brunfelsia.*
      L. Leaves very narrow, mostly less than ¼ inch wide; flowers very long and narrow, 4–5½ inches long.—688. *Brunfelsia densifolia.*
      LL. Leaves broad, more than ¾ inch wide; flowers 2–4 inches long.
        M. Leaves broadest toward abruptly short-pointed apex, tapering to base; flowers 4 inches long.—690. *Brunfelsia portoricensis.*
        MM. Leaves broadest near middle.
          N. Leaves thick and leathery; flowers 3–4 inches long.—689. *Brunfelsia lactea.*
          NN. Leaves only slightly thickened; flowers 2 inches long.—687. *Brunfelsia americana.*

686. Gallinero — *Acnistus arborescens* (L.) Schlecht.

This shrub or small tree of openings in moist areas is characterized by: (1) elliptic leaves 3–6 inches long and 1¼–3 inches wide, sometimes larger, mostly long-pointed at both ends; (2) many whitish bell-shaped flowers about ⅜ inch long, clustered along the twigs mostly back of leaves; and (3) many shiny yellow or orange berries ¼–5/16 inch in diameter along the twigs.

An evergreen shrub or small tree becoming 20 feet high and 6 inches in trunk diameter, with crown of open branches. The light brown or gray bark is finely fissured, the inner bark whitish and bitter. The long stout twigs are light gray or brown and finely hairy.

The alternate leaves have light green petioles ¾–1 inch long. The blades are thin or slightly thickened, not toothed on edges, the upper

686. Gallinero

Acnistus arborescens (L.) Schlecht.

Flowering twig (left), fruiting twig (right), natural size.

surface dull light green and hairless, and the lower surface paler and sometimes hairy.

Flower clusters (like umbels) up to 2 inches across consist of many fragrant flowers spreading on slender nearly equal stalks ½–1 inch long. Each flower has a whitish cup-shaped calyx ⅛ inch long, 5-toothed at apex; whitish tubular bell-shaped corolla nearly ⅜ inch long, with 5 spreading pointed lobes; 5 stamens borne near base of tube and slightly longer; and slender pistil with green 2-celled ovary and long slender style.

The fruits (berries) with calyx persistent at base are 2-celled and contain many light yellow seeds about 1/16 inch long. The juicy pulp is almost tasteless or slightly bitter and not edible, though eaten by birds. With flowers in spring and with fruits in spring and summer.

The wood is light brown and hard.

Elsewhere the shrubs have served in hedges and living fence posts. Chickens eat the fruits. However, according to an old report, the fruits can cause death.

Uncommon and scattered in openings and clearings in upper Luquillo and upper Cordillera forests at 1,500–3,000 feet altitude in mountains of eastern and central Puerto Rico. Also in St. Thomas and Tortola.

PUBLIC FORESTS AND PARK.—Carite, Guajataca, Guilarte, Luquillo, Río Abajo, Toro Negro; Sage Mountain.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, and through Lesser Antilles from Saba and Montserrat to Grenada and Trinidad and Tobago. Also from Mexico and Guatemala to Peru and Brazil.

OTHER COMMON NAMES.—galán arbóreo, palo de gallina (Puerto Rico); mata gallina (Dominican Republic); tabaco de monte (Nicaragua); güitite (Costa Rica); tomatoquina, tabalgue, fruto gallino (Colombia); nigüito, uvito (Venezuela); cojojo (Ecuador); quiebra ollas, macapaqui, toque (Peru); wild tobacco (Trinidad and Tobago); sureau (Martinique); marianeira, mariana, mixito, fruta de sabía (Brazil).

BOTANICAL SYNONYM.—*Dunalia arborescens* (L.) Sleumer.

687. Aguacero — *Brunfelsia americana* L.

Aguacero, a shrub or small tree of eastern mountains of Puerto Rico and Virgin Islands, is often planted in gardens as an ornamental. It is distinguished by: (1) elliptic to obovate leaves 1½–4 inches long, slightly thickened; (2) narrow flowers mostly single at twig ends, the corolla about 2 inches long with 5 spreading rounded lobes, white with purplish center, turning to yellow; and (3) round yellow fruits ⅜–1 inch in diameter. From the 3 related tree species of this genus described and illustrated here, this species differs in its smaller flowers and fruits.

An evergreen shrub 3–10 feet high or a small tree to 15 feet. The twigs are hairless or often hairy.

The alternate leaves are crowded on short side twigs and have petioles mostly less than ¼ inch long. Blades are abruptly short-pointed, blunt, or notched at apex, short-pointed or blunt at base, slightly turned under at edges, the upper surface shiny and almost hairless, and the lower surface paler and often finely hairy.

The solitary fragrant flowers have stalks less than ¼ inch long; a bell-shaped calyx ¼ inch long, finely hairy with 5 rounded lobes; corolla about 2 inches long with narrow tube about 3/16 inch wide and 5 rounded spreading lobes about 1½ inches across. The berry fruits with calyx at base contain many elliptic brown seeds more than ⅛ inch long. Flowering in spring and fruiting in summer.

Uncommon locally in moist coastal forest and lower Cordillera (Coamo) from sea level to 1,800 feet altitude in eastern and central Puerto Rico. Also in Vieques, St. Croix, St. Thomas, St. John, Tortola and Virgin Gorda.

Planted for many years in gardens through Puerto Rico and probably elsewhere in West Indies, also in southern Florida, Colombia and Venezuela. The berries reportedly are poisonous.

PUBLIC FOREST AND PARKS.—Luquillo; Virgin Islands, Gorda Peak.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, also Lesser Antilles from St. Martin, Saba, and St. Eustatius to Dominica. Also Martinique, perhaps introduced.

OTHER COMMON NAMES.—alelí falso, trompeta de ángel, tulipán sencillo (Puerto Rico); aguacero, dama de noche (Dominican Republic); fleur trompette (Martinique); galán, lady-of-the-night (Dutch Antilles); rain-tree, empoisonneur (Dominica).

This species native also in several other islands apparently is the original immigrant of its genus to Puerto Rico. Two closely related species endemic in eastern mountains of Puerto Rico may have been derived from the first. They are No. 689, vega blanca, *B. lactea* Krug & Urban, and No. 690, *B. portoricensis* Krug & Urban, both described and illustrated here. The generic name honors Otto Brunfels (1488–1534), German physician and botanist.

687. Aguacero

Brunfelsia americana L.

Fruit (upper left), flowering twig, and flower (lower left), natural size.

688. ***Brunfelsia densifolia*** **Krug & Urban**

This distinctive small tree known only from mountain forests of western Puerto Rico is identified by: (1) very narrow shiny leathery leaves clustered at ends of twigs; (2) very long narrow flowers single at twig ends with corolla 4–5½ inches long and about ⅛ inch in diameter of tube, with 5 spreading lobes, white, turning to yellow; and (3) rounded ball-like fleshy fruits 1 inch or more in diameter, turning from green to yellow.

A small evergreen tree 15–30 feet high and 5 inches in trunk diameter, with several main stems and many branches, hairless. The gray bark is smoothish with few warts, becoming slightly furrowed, the light brown inner bark slightly bitter. Twigs are light brown, slender.

Leaves alternate but crowded mostly on short side twigs. The linear to linear-oblanceolate blades are 2–4 inches long and mostly less than ¼ inch wide, short-pointed or blunt at apex, mostly widest beyond middle, not toothed on edges, and tapering gradually to the short slender petiole mostly less than ¼ inch long. The upper surface is shiny green, with fine raised side veins, almost parallel with midvein, and the lower surface is yellow green with raised veins.

Flowers are borne singly on stalks of ⅜ inch or less. The narrowly bell-shaped calyx about ¼ inch long has 5 short rounded lobes; the corolla 4–5½ inches long has a cylindric tube slightly more than ⅛ inch in diameter, ending abruptly in 5 widely spreading rounded lobes almost ½ inch long and nearly 1 inch across, white when fresh but turning to yellow; stamens within the tube, 2 fertile and 2 sterile; and pistil with 2-celled ovary containing many ovules, long threadlike style, and 2-lobed stigma. The berry fruits surrounded by longer leaves have enlarged split calyx at base and hard walls that do not split open. There are many brown elliptic seeds more than ⅛ inch long. With flowers in spring and summer and fruits in summer and fall.

The wood is light brown and hard.

Uncommon in upper Cordillera forest at higher altitudes (2,000–2,700 feet) on serpentine bedrock in western Puerto Rico.

PUBLIC FOREST.—Maricao.

RANGE.—Western Puerto Rico.

This species is so distinct in flowers and foliage that it was considered as possibly representing a separate genus.

688. *Brunfelsia densifolia* Krug & Urban

Flowering twig (left), fruiting twig (right), natural size.

689. Vega blanca ***Brunfelsia lactea*** **Krug & Urban**

A shrub or small tree known only from high mountains of eastern Puerto Rico, distinguished by: (1) elliptic leathery leaves 2–6 inches long and 1–2¼ inches wide, with edges turned under; (2) large very fragrant flowers single at twig ends, 3–4 inches long, with narrow tube and 5 rounded lobes 3 inches across, pale yellow or whitish or becoming pink tinged; and (3) round fleshy fruits ¾–1 inch in diameter, turning from green to orange brown.

Evergreen shrub 3–10 feet high, or a small tree to 20 feet high and 4 inches in trunk diameter, recorded to 40 feet, hairless throughout. Bark light brown, slightly fissured, covered with mosses and liverworts, the inner bark whitish and almost tasteless. Twigs light brown, with narrow ridges.

Leaves alternate, scattered or clustered at ends of short side twigs, on petioles 3/16–⅝ inch long. Blades varying from long-pointed to blunt at both ends, leathery, green on both surfaces with network of many fine raised veins, slightly shiny above.

The large flowers are borne singly on stalks about ⅜ inch long at ends of twigs but sometimes appearing lateral on short twigs. The bell-shaped calyx nearly ½ inch long has 5 short rounded lobes; the corolla 3–4 inches long has a tube less than ¼ inch in diameter and 5 rounded lobes about 3 inches across, nearly as broad as length of tube, pale yellow or whitish or becoming pink tinged; stamens within the tube, 2 fertile and 2 sterile; and pistil with 2-celled ovary containing many ovules, long threadlike style, and 2-lobed stigma. The berry fruits with calyx at base and hard walls do not open. Seeds many, elliptic, brown, about ⅛ inch long. With flowers and fruits through the year.

The wood is hard and light brown.

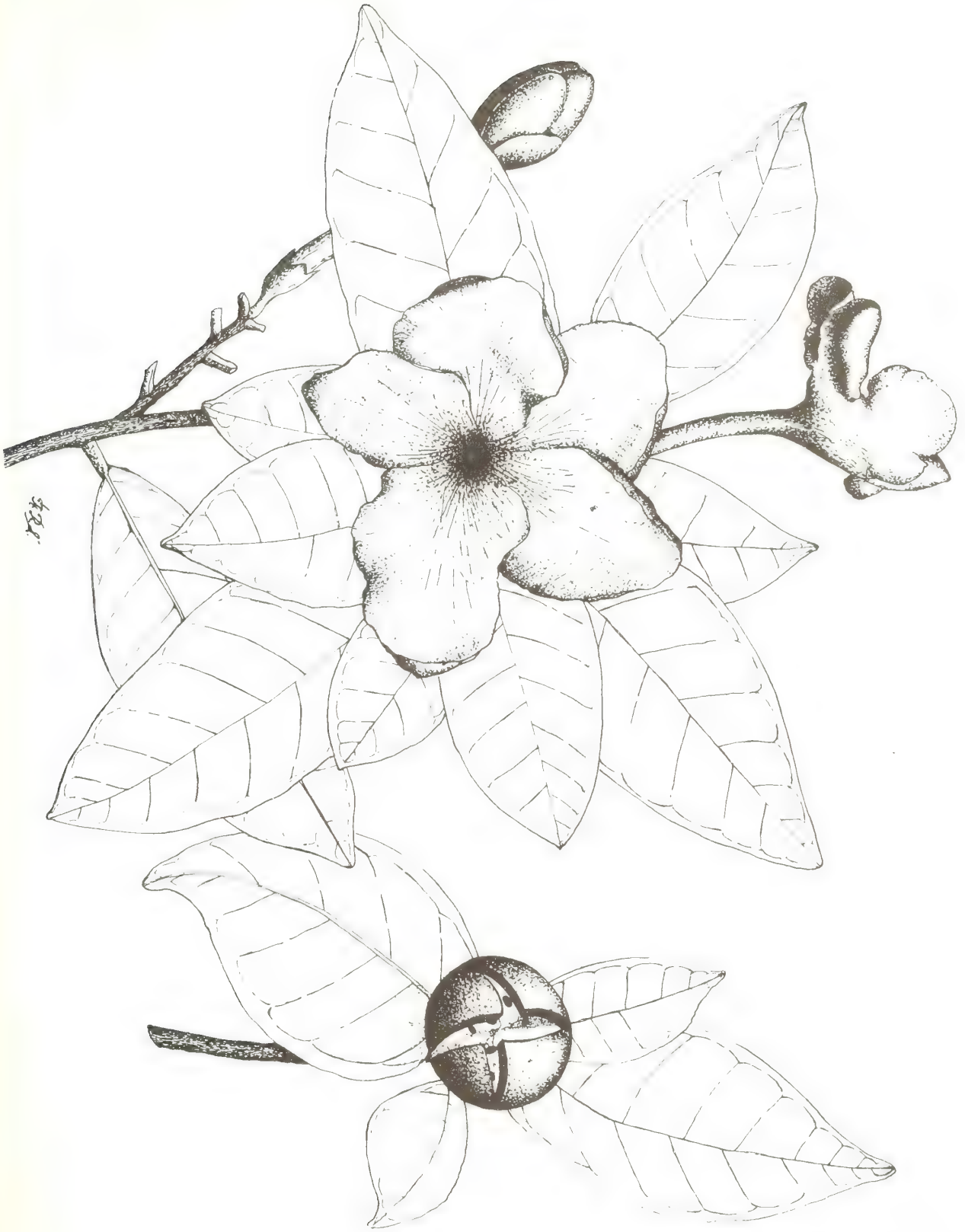
This shrub with large very fragrant flowers might be suitable as an ornamental. The common name jazmín del monte was suggested.

Rare and local in dwarf forest to summits of eastern mountains at 3,000–3,500 feet altitude, including Luquillo Mountains and Monte Torito near Cayey.

PUBLIC FORESTS.—Carite, Luquillo.

RANGE.—Known only from high mountains of eastern Puerto Rico.

OTHER COMMON NAME.—jazmín del monte (Puerto Rico).



689. Vega blanca

Brunfelsia lactea Krug & Urban

Flowering twig (above), fruiting twig (below), natural size.

690. ***Brunfelsia portoricensis* Krug & Urban**

This handsome rare shrub of Luquillo Mountains seldom reaches tree size. It is easily recognized by: (1) obovate to oblanceolate leaves abruptly short-pointed at apex; (2) large flowers few or single, about 4 inches long, the white corolla with narrow cylindric tube and 5 large rounded lobes about 2½ inches across; and (3) yellow rounded fruits 1–1¼ inches in diameter.

An evergreen shrub 3–10 feet high, rarely a small tree to 15 feet high and 3 inches in trunk diameter, hairless throughout. Twigs stout, brown, fissured.

Leaves alternate, sometimes crowded, with stout petioles ¼ inch long. Blades are 3–6 inches long and ⅞–2 inches wide, broadest beyond middle and tapering to long-pointed base, not toothed on edges, slightly thick and leathery, the upper surface shiny green with sunken midvein and many fine side veins at about 45° angle, and the lower surface dull light green.

Flowers few or single, at ends or sides of twigs on short stalks of less than ½ inch. The tubular cylindric calyx 1¼–1¾ inches long splits irregularly to middle on 1 side or into 2 lobes; the corolla tube 2½–3½ inches long and only ⅛–3/16 inch in diameter, finely hairy, with 5 spreading lobes about 1 inch long; stamens 4 in pairs inside corolla tube; and pistil with 2-celled ovary, long slender style, and stigma slightly 2-lobed. The berrylike fruit has calyx at base, and thick wall. There are many elliptic brown seeds 3/16 inch long. With flowers in spring and summer and with mature fruits in summer.

This species might make an attractive ornamental in cultivation for its large white flowers and shiny foliage.

Rare in lower Luquillo forest at 1,500–1,800 feet altitude in Luquillo Mountains only.

PUBLIC FOREST.—Luquillo.

RANGE.—Known only from Luquillo Mountains of eastern Puerto Rico.

690. *Brunfelsia portoricensis* Krug & Urban

Flowering twig (above), fruit (below), natural size.

691. Dama de día, day cestrum ***Cestrum diurnum* L.***

This common introduced shrub or rarely small tree of gardens, roadsides, and pastures is identified by: (1) oblong leaves 2½–4 inches long and 1–1½ inches wide, shiny green to yellow green above and dull whitish green beneath; (2) several to many flowers clustered at bases of uppermost leaves, ½–⅝ inch long, the white corolla with narrow tube and 5 short blunt lobes turned back; and (3) elliptic purplish black berries 5/16 inch long.

An evergreen shrub or rarely small tree 15 feet high and 3 inches in trunk diameter. The bark is smoothish gray, the inner bark yellow brown and slightly bitter. Twigs are slender and greenish gray, often with fine pressed hairs.

The alternate leaves have light green petioles ¼–½ inch long. Leaf blades are short-pointed at apex, short- or blunt-pointed at base, not toothed on edges, slightly thickened, and hairless or hairy on veins beneath.

The slightly fragrant white flowers are in almost stalkless groups near the ends of slender stalks of ½–2½ inches. The whitish green calyx is bell-shaped and 5-toothed; the white corolla has narrow tube and 5 short blunt lobes turned back; the 5 stamens with short straight stalks are within corolla tube near mouth and alternate with lobes; and the pistil has a rounded 2-celled ovary with several ovules, slender style, and exposed flat stigma. The juicy berries, whitish before maturity, have calyx at base and contain several brown angled seeds ⅛ inch long. Flowering and fruiting probably irregularly through the year.

The wood is whitish and hard.

Very common in gardens, roadsides, and along fences at low to middle altitudes in moist areas of Puerto Rico. Apparently introduced for ornament and spread by birds along fences and roadsides. Also planted in gardens in Virgin Islands. Propagated by seeds and cuttings.

RANGE.—Bahamas, Cuba, Jamaica, Cayman Islands, and Hispaniola, and introduced in Puerto Rico and elsewhere in West Indies. Also in continental tropical America from Mexico to Honduras and southward, the range spread by cultivation to South America. Introduced into southern Florida and escaping from cultivation.

OTHER COMMON NAMES.—rufiana (Dominican Republic); galán de día (Cuba); Juan de noche (Mexico); saúco tintóreo (Colombia); dama de noche (Venezuela); day cestrum, day jessamine (English); wild jasmine, ink-bush (Jamaica).

As the scientific, Spanish, and English names indicate, this species has open flowers in the daylight hours. In contrast, the related species No. 693, dama de noche, lady-of-the-night, *Cestrum nocturnum* L.,* is night-flowering and very fragrant at that time.

691. Dama de día, day cestrum

Cestrum diurnum L.*

Natural size.

692. Galán del monte ***Cestrum macrophyllum* Vent.**

Shrub or small tree of moist forests to high altitudes in mountains. Distinguishing characters are: (1) dull green broadly elliptic leaves 2½–7 inches long and 1¼–4 inches wide, with stout leafstalks; (2) few narrowly tubular flowers ½ inch long at leaf bases and back of leaves; and (3) shiny purplish black elliptic to rounded fleshy fruits more than ⅜ inch long, like a small eggplant.

Evergreen shrub or vinelike small tree 15–20 feet high and 3 inches in trunk diameter, widely spreading, hairless. The bark is gray, smoothish. Inner bark light brown, streaked, with taste like raw potato. The light gray twigs have slightly raised half-round leaf scars.

The alternate leaves have stout leafstalks ½–1 inch long. The blades are short-pointed at both ends, slightly turned under at edges, slightly thickened, with few curved side veins, the lower surface light green.

The short-stalked slightly fragrant flowers have a bell-shaped 5-toothed green calyx ⅛ inch long with narrow funnel-shaped tube and 5 rounded lobes, cream-colored, turning pale yellow; 5 alternate stamens on and within corolla tube; and pistil with 2-celled ovary, threadlike style and dot stigma. The berries with green calyx at base have green tasteless flesh and 6–3 narrow blackish brown seeds 3/16 inch long. Flowering and fruiting throughout the year.

The wood is light brown or whitish and slightly soft.

Elsewhere the plants are grown as ornamentals.

Common in lower and upper Luquillo and Cordillera and moist limestone forests, also dwarf forest, at 800–3,800 feet altitude throughout mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Guajataca, Luquillo, Maricao, Río Abajo, Toro Negro.

RANGE.—Hispaniola and Puerto Rico.

OTHER COMMON NAME.—rufiana (Dominican Republic).

This species was named in 1803 from plants in gardens of Paris, the seeds of which were from Puerto Rico.

693. Dama de noche, lady-of-the-night ***Cestrum nocturnum* L.***

An ornamental evergreen shrub or sometimes a small tree occasionally planted for the clusters of small night-blooming flowers, with several stems from base and long slender twigs, hairless throughout. Distinguishing characters are: (1) alternate lanceolate or narrowly ovate thin leaves 2½–6 inches long and 1–2 inches wide, long-pointed at apex and rounded or short-pointed at base, dull green on both surfaces, with short petioles of ½–¾ inch; (2) usually many fragrant flowers in branched clusters (panicles) 1–3 inches long mostly at leaf bases, short-stalked, composed of 5-lobed calyx ⅛ inch long, narrow funnel-shaped yellow or greenish-yellow corolla ¾–⅞ inch long with 5 short lobes, 5 stamens within tube, and pistil with oblong ovary and long slender style; and (3) fruits, reportedly poisonous, consisting of clusters of oblong white berries about ⅜ inch long, with calyx at base, the whitish pulp containing 3–4 dark brown seeds. Often planted in Puerto Rico and Virgin Islands in gardens, hedges, and around houses and escaping from cultivation. RANGE.—Cuba, Jamaica, and Hispaniola, also from Mexico to Honduras. Recorded from Martinique but perhaps introduced. Planted for ornament through West Indies and north to Florida and south to Brazil. OTHER COMMON NAMES.—dama de noche (Spanish); rufiana, jazmín de noche (Dominican Republic); galán de noche (Cuba); huele de noche (Mexico, Central America); palo hediondo (El Salvador); zorillo (Costa Rica); night-blooming cestrum, night cestrum (English); jasmine (Jamaica); sopillo (British Honduras); lilas de nuit, jasmin de nuit (Haiti).

692. Galán del monte

Cestrum macrophyllum Vent.

Fruiting twig (center), flowers (right), natural size.

694. Matabuey ***Goetzea elegans* Wydler**

Matabuey is one of the most distinctive of the rare endemic trees of Puerto Rico, even having been made the type of a new small plant family. It is characterized by: (1) elliptic shiny leaves with many straight parallel raised side veins; (2) funnel-shaped orange flowers nearly 1 inch long, with 6-lobed corolla, usually borne singly at leaf bases; and (3) orange rounded or elliptic berries ¾ inch long.

An evergreen small tree 20–30 feet high and 5 inches in trunk diameter. Bark brown, becoming rough and much fissured, the inner bark whitish and almost tasteless. The slender twigs and petioles are brown and minutely hairy.

Leaves alternate, with petioles ⅛–¼ inch long. Blades elliptic, 1–4 inches long and ½–2 inches wide, short-pointed at both ends, not toothed on edges, slightly thickened, with many straight parallel side veins raised on both surfaces, the upper surface shiny green and hairless, and the lower surface light green and minutely hairy.

Flowers are borne singly at leaf bases on slender brown hairy stalks ¼–½ inch long, sometimes few in terminal clusters (cymes). The flower is composed of a bell-shaped calyx ¼ inch long, finely brown hairy, with 6 pointed lobes; funnel-shaped orange minutely hairy corolla ¾ inch long and ⅝–¾ inch across the 6 rolled back blunt lobes; 6 slender stamens borne near base of corolla and projecting beyond; and pistil with hairy 2-celled ovary bearing few ovules, slender style, and 2-lobed stigma. The berries are finely hairy, thick-walled, and bear persistent calyx at base. Seeds elliptic, ¼ inch long. Collected with flowers and fruits from May to August.

The wood is whitish and hard.

Worthy of cultivation as an ornamental with shiny leaves, showy orange flowers, and orange fruit, as the name meaning elegant suggests. However, the plant, perhaps the fruit, was reported long ago to be poisonous.

Very rare and local, known only from a few places in the moist limestone and moist coastal forests at 200–600 feet altitude on north coast of Puerto Rico only. Collected near Aguadilla, Guajataca Gorge near Quebradillas, Guajataca, and Cambalache, and by H. F. A. Eggers in 1883 at Jímenez near Río Grande, north of Luquillo Mountains.

PUBLIC FORESTS.—Cambalache, Guajataca.

RANGE.—Puerto Rico only.

OTHER COMMON NAME.—manzanilla (Puerto Rico).

The genus *Goetzea*, honoring Johann Ephraim Goetze (1731–1793), German theologian, was named for this species in 1830 by Heinrich Wydler (1800–1883), from Switzerland, who collected the type specimen in 1827. About a century later, in 1929, a second species, *G. ekmanii* O. E. Schulz, was named as a shrub from Hispaniola. In 1966 the plant family Goetzeaceae was proposed for a small group of 5 genera and 7 species of Mexico and the West Indies.

This species was not found by Britton and Wilson (*10*), who remarked that it was not recently observed by botanists. It was rediscovered by foresters in 1936 in northern foothills of the Luquillo Mountains and again at Cambalache Experimental Forest in 1950.

694. Matabuey *Goetzea elegans* Wydler

Flowering twig (above), fruiting twig (lower right), two-thirds natural size.

695. ***Solanum antillarum*** **O. E. Schulz**

This shrub or small tree is widely distributed in Puerto Rico, especially in higher mountains, but was not listed until recent years. It is easily distinguished from related species by: (1) spines absent and hairs almost lacking; (2) leaves in pairs but very unequal in size, elliptic, the larger 3–5 inches long and 1¼–2 inches wide or larger; (3) flowers several on slender stalks opposite the leaves, more than ⅜ inch across the white 5-lobed star-shaped corolla; and (4) round orange berries 5/16 inch in diameter.

Evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, sometimes with several trunks, much branched, with spreading crown. The bark is smoothish, brown or gray, with many small warts (lenticels), the inner bark whitish and slightly bitter. Twigs are green, minutely hairy when young, sometimes zigzag.

The opposite leaves are long-pointed at apex, short-pointed at base and tapering into the narrowly winged slender petiole ¼–½ inch long, with straight or slightly wavy margins, the upper surface dull green with veins slightly sunken, and the lower surface light green with raised veins and tufts of hairs in vein angles along midvein. The smaller leaf of the pair is 1–2½ inches long and ½–1¼ inches wide.

Flower clusters (short racemes like umbels) 1–1½ inches long bear few to several flowers on slender stalks ½–¾ inch long. The flower is composed of bell-shaped green calyx ⅛ inch long with 5 short blunt lobes; star-shaped corolla with 5 widespreading turned back lobes more than ⅜ inch across, white with purple streak on outside of each lobe; 5 yellow stamens ⅛ inch long; and pistil with hairless ovary and slender style. Berries round, with enlarged calyx at base, turning from green to orange, with many seeds more than 1/16 inch long. With flowers and fruits throughout the year.

The wood is whitish or light brown and hard.

Rare in upper mountain forests including understory, openings, and cutover areas. At altitudes mostly 1,500–3,500 feet in high mountains of eastern and central Puerto Rico but as low as 300 feet in moist limestone forest.

PUBLIC FORESTS.—Guilarte, Luquillo, Río Abajo, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, and Lesser Antilles south to St. Vincent and Grenada.

OTHER COMMON NAMES.—arito, mantequita (Dominican Republic); ajicillo, tabaco cimarrón (Cuba).

This species not mentioned by Britton and Wilson (*10*) had been collected earlier on the other three of the Greater Antilles as well as the Lesser Antilles. Following its discovery in Puerto Rico in 1950 by the U.S. Forest Service, it has been found in the four public forests listed above.

696. Erubia ***Solanum drymophilum*** **O. E. Schulz**

A very rare shrub or small tree 10–20 feet high and to 3 inches in trunk diameter, distinguished by: (1) straight yellow spines or prickles to ⅜ inch long, on twigs and sometimes midveins of lower leaf surfaces; (2) star-shaped hairs on twigs, flower clusters, and leaves, especially petioles and lower leaf surfaces; (3) narrow oblong to lanceolate thin leaves 3–8 inches long and ½–1¼ inches wide, long-pointed at apex, unequal and blunt or notched at base, not toothed on edges, the short petioles less than ⅜ inch long; (4) several to many flowers along a slender axis (raceme) on very slender stalks of ¼–½ inch, with 5-lobed hairy calyx less than ⅛ inch long, white 5-lobed star-shaped hairy corolla ¾ inch broad, 5 stamens on corolla and united by stalks, with long yellow anthers, and pistil with round ovary and slender style; and (5) round shiny black berries nearly ¼ inch in diameter. With flowers and fruits through the year. Known only from upper Cordillera forest of eastern and central mountains (Luquillo to Cayey and Adjuntas) in Puerto Rico at middle and high altitudes (2,500 feet). PUBLIC FORESTS.—Carite, Luquillo, Toro Negro. RANGE.—Puerto Rico only.

695. *Solanum antillarum* O. E. Schulz

Flowering twig (above), fruiting twig (lower right), natural size.

697. Berenjena de paloma, wild tobacco, mullein nightshade ***Solanum erianthum*** **D. Don**

Berenjena de paloma, a large shrub sometimes becoming a small tree, is recognized by: (1) whitish green star-shaped hairs on twigs, leaves, flowers, and fruits; (2) ovate to elliptic leaves 4–8 inches long and 1½–4 inches wide, sometimes larger, the lower surface whitish green and soft, covered with dense star-shaped hairs; (3) star-shaped flowers with 5-lobed spreading white corolla ½–¾ inch wide; and (4) rounded yellow berries ½–¾ inch in diameter. Further distinguished from some related species by the absence of spines.

An evergreen shrub 3–10 feet high, sometimes a small tree to 15 feet high and 3 inches in trunk diameter. Bark greenish gray, smoothish with scattered raised dots (lenticels), the inner bark light gray and slightly bitter. The twigs are whitish with dense star-shaped hairs.

The alternate leaves have petioles ½–2 inches long, sometimes larger, covered with star-shaped hairs. Blades mostly long-pointed at apex, rounded or short-pointed at base, the edges straight or very slightly wavy, thin, the upper surface green and finely hairy, and the lower surface whitish green and covered with dense star-shaped hairs.

The erect terminal branched flower clusters (cymes) 3–4 inches long bear several to many flowers on stout hairy stalks ¼–½ inch long. The flower consists of light green calyx about ¼ inch long, densely hairy, with 5 pointed lobes; white corolla with short tube and 5 widely spreading pointed lobes; 5 stamens with long yellow anthers inserted on throat of corolla; and pistil with hairy 2-celled ovary and slender style. The berries have calyx persistent at base, turn from green to yellow, and contain many small brownish seeds about 1/16 inch in diameter. With flowers and fruits through the year.

The wood is light brown and hard.

Uncommon but widespread in open areas, clearings, waste places, and thickets in dry and moist limestone forests from sea level to 300 feet altitude in western Puerto Rico. Also in Mona, Muertos, Vieques, St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC FOREST AND PARK.—Guánica; Virgin Islands.

RANGE.—Widely distributed through West Indies from Bahamas southeastward. From northern Mexico south through Central America and northern South America to Peru. Apparently native in Florida Keys. Naturalized in southern Florida and perhaps elsewhere beyond the natural range. Also in Old World tropics.

OTHER COMMON NAMES.—tabacón afelpado (Puerto Rico); wild tobacco, turkey-berry (Virgin Islands); tabacón, tabacuelo, friega-platos (Dominican Republic, Central America); pendejera, pendejera macho, pendejera hedionda, tabaco cimarrón (Cuba); berenjena (Mexico); hediondilla, tabaco bobo (Guatemala); tapalayote (El Salvador); hoja blanca (Honduras); zorillo (Costa Rica); mullein nightshade, potato-tree (United States); mullein-leaved solanum, wild tobacco, salve-bush (Bahamas); amourette, tabac marron, zamorette male, zamorette marron (Haiti).

BOTANICAL SYNONYM.—*Solanum verbascifolium* Jacq., not L.

The common name friega-platos, meaning plate-scrubber, refers to the use of the hairy leaves of this and related species for cleaning greasy dishes.

697. Berenjena de paloma, wild tobacco, mullein nightshade *Solanum erianthum* D. Don

Fruiting twig (above), flowering twig (lower left), two-thirds natural size.

698. Cakalaka-berry ***Solanum polygamum*** **Vahl**

This spiny shrub of dry areas rarely reaches tree size. Distinguishing characters are: (1) very slender sharp yellowish spines 1/8–3/8 inch long on twigs and sometimes midveins of leaves; (2) minute grayish star-shaped hairs forming dense mostly yellowish-gray cover on twigs, petioles, and the oblong to ovate leaf blades; (3) flowers partly male and bisexual (polygamous), about 3/4–1 inch across the 4–7 spreading purplish or whitish corolla lobes; and (4) round orange or red berries about 3/4 inch in diameter, with spiny enlarged calyx.

A shrub 3–10 feet high, rarely a small tree to 15 feet and 3 inches in trunk diameter. The alternate leaves have petioles of 1/4–1/2 inch (to 1 1/4 inches) in length. Leaf blades are mostly 1 1/4–4 inches (to 6 1/2 inches) long and 3/4–1 3/4 inches wide, short-pointed or blunt at apex, blunt, rounded, or unequal at base, straight or wavy along edges, slightly thickened, the upper surface green, and lower surface yellowish-gray hairy.

Male flowers are in clusters of 1–20, composed of hairy 4–5 lobed calyx, corolla with 4 or 5 narrow pointed spreading lobes, and 4–5 stamens alternate with lobes. Bisexual flowers borne singly are slightly larger and have parts mostly 5–7 and pistil with densely hairy rounded ovary, slender style, and enlarged stigma. The berries with enlarged spiny calyx at base are hairy and contain many brownish seeds 1/8 inch in diameter. Flowering and fruiting from late winter (February) to summer.

Uncommon in dry limestone forests near sea level, collected in Puerto Rico between Punta Diablo and Salinas. Also in Vieques, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC PARKS.—Virgin Islands, Gorda Peak.

RANGE.—Puerto Rico and Virgin Islands. Recorded also from Hispaniola and Guadeloupe.

698. Cakalaka-berry

Solanum polygamum Vahl

Flowering twig, natural size.

699. Berenjena cimarrona, turkey-berry ***Solanum torvum*** **Sw.**

A common shrub widespread through moist areas of Puerto Rico and the Virgin Islands sometimes becoming treelike. Its distinguishing characters are: (1) young twigs, petioles, lower leaf surfaces, and branches of flower clusters with gray-green cover of star-shaped hairs; (2) sharp green to brown straight spines or prickles to ¼ inch long scattered along twigs, sometimes also on petiole and midvein beneath; (3) mostly paired, ovate to elliptic leaves with border often wavy or with as many as 7 lobes, the upper surface slightly rough hairy and lower surface soft hairy; (4) star-shaped flowers more than ¾ inch across the 5-lobed white corolla; and (5) round berries ⅜–⅝ inch in diameter, green to yellow.

An evergreen shrub 3–10 feet high, sometimes a small tree 15 feet high and 3 inches in trunk diameter, spreading and much branched. Bark light gray, smooth with raised dots (lenticels). The inner bark is whitish within a light green outer layer, slightly bitter. The stout gray-green twigs are soft hairy, spiny, and widely forking.

Leaves opposite or sometimes 1 at a node, with stout round hairy petioles ½–2 inches long. Blades are 3–8 inches long and 1¾–7 inches wide, short-pointed at apex, unequal and notched or rounded at base, the borders with as many as 7 short-pointed lobes or none, thin, the upper surface dull yellow green, and the lower surface gray green with prominent network of veins.

Flower clusters (cymes) are lateral, 1–3 inches long, bearing several to many flowers on slender gland hairy stalks about ¼ inch long on 1 side of curving branches, 1 or 2 opening at a time and soon shedding. The green gland hairy calyx about 3/16 inch long has a short tube and 5 narrow pointed lobes; the white corolla has a very short tube and 5 long-pointed lobes about ½ inch long, spreading in form of a star; 5 stamens with large yellow anthers, inserted between the corolla lobes; and pistil with 2-celled ovary and slender style. The fruits, 1 or 2, hang down from stout stalks, have calyx at base, and are 2-celled. There are many rounded flat brown seeds 1/16 inch long. With flowers and fruits through the year.

The wood is pale yellow or whitish and soft.

The roots and fruits have served in home remedies. Also the plants have served as stocks for grafting cultivated eggplant or berenjena (*Solanum melongena* L.).

Abundant in open areas and thickets of all forest types except high peaks, a weed in waste places, from sea level to 3,000 feet altitude. Throughout moist areas of Puerto Rico and smaller islands eastward. Also Vieques, Culebra, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

PUBLIC FORESTS AND PARKS.—Probably all forests; Virgin Islands, Gorda Peak.

RANGE.—Through West Indies. Also Florida and from Mexico through Central America and northern South America to Venezuela. Also in the Old World tropics.

OTHER COMMON NAMES.—turkey-berry (Virgin Islands); shoo-shoo-bush (Tortola); berenjena cimarrona, berenjena de gallina, tabacón (Dominican Republic); pendejera (Cuba); tomatillo (Guatemala); berengena, berengena silvestre, berenjena cimarrona (Dominican Republic, Costa Rica); friega-platos (Colombia); tall red trubba (Barbados); zamorette (Haiti); bâtard belongène (Dominica).

BOTANICAL SYNONYM.—*Solanum ficifolium* Ort.

BIGNONIA FAMILY (BIGNONIACEAE)

Mostly woody vines, also shrubs and trees often large, rarely herbs, known by: (1) leaves mostly opposite, sometimes alternate, palmately or pinnately compound or bipinnate, sometimes simple, without stipules; (2) flowers generally large, showy, in cymes and racemes, bisexual, slightly irregular, with tubular 5-toothed or 5-lobed calyx, large tubular corolla, colored and commonly yellow, pink, or whitish, funnel- or bell-shaped, with 5 unequal lobes sometimes in 2 lips, stamens usually 4 large in pairs and 1 staminode inserted in tube, and on disk the pistil with superior 2-celled ovary containing many ovules, long thin style, and 2 stigmas; and (3) fruit usually a 2-parted capsule often long like a pod, with many winged seeds or a berry. Also vol. 1, p. 490.

699. Berenjena cimarrona, turkey-berry *Solanum torvum* Sw.

Flowers, fruits, and leaf, two-thirds natural size.

Key to species

A. Leaves simple.
  B. Leaves mostly crowded in clusters of 3–5 or more along stout twigs; fruits gourdlike, rounded or elliptic.—*Crescentia.*
    C. Leaves spoon-shaped, broadest beyond middle, blunt or short-pointed at apex.
      D. Leaves thin; fruit round, 4–12 inches in diameter.—232. Higüero, calabash-tree, common calabash-tree, *Crescentia cujete* L.
      DD. Leaves thick and stiff; fruit cylindric, pointed, 3–4 inches long.—702. *Crescentia portoricensis.*
    CC. Leaves very narrow, stiff, long-pointed and often spiny tipped; fruit rounded or elliptic, 1¼–2 inches long.—701. *Crescentia linearifolia.*
  BB. Leaves otherwise.
    E. Leaves alternate, broadly elliptic to obovate, thick and leathery; fruit gourdlike, egg-shaped or elliptic, 2½–4 inches long.—703. *Enallagma latifolia.*
    EE. Leaves opposite or partly in 3's.
      F. Leaves partly in 3's (whorled), oblong to lanceolate, with light green spot at base of blade above, slightly thickened, slightly wavy at edges; pod very long and narrow like wire.—700. *Catalpa longissima.**
      FF. Leaves opposite, stiff and leathery, with edges turned under; fruit a cigarlike capsule.
        G. Leaves elliptic to ovate, broadest near middle.—237. Roble de sierra, *Tabebuia rigida* Urban.
        GG. Leaves obovate or oblanceolate, broadest beyond middle.—709. *Tabebuia schumanniana.*
AA. Leaves compound.
  H. Leaves digitate (palmately compound) with mostly 5 or 3 leaflets.
    I. Leaflets 3, with petiole narrowly winged; fruit cylindric, fleshy, not splitting open.—*Parmentiera.*
      J. Spines 2 (sometimes 1) at some nodes; fruit 4–6 inches long, angled, like a large pickle.—705. *Parmentiera edulis.**
      JJ. Spines none; fruit 1–2 feet long, like a candle.—704. *Parmentiera cerifera.**
    II. Leaflets mostly 5 or sometimes fewer (7 in No. 706); petiole not winged; fruit a cigarlike capsule.
      K. Flowers with yellow corolla; introduced trees.
        L. Leaflets 5, obovate to elliptic, ending in long narrow point.—707. *Tabebuia glomerata.**
        LL. Leaflets 7, elliptic, short- or long-pointed.—706. *Roseodendron donnell-smithii.**
      KK. Flowers with pink or red corolla; native trees (except No. 708).
        M. Corolla pink or sometimes purplish.
          N. Leaflets 5 or fewer (sometimes only 1), elliptic, 1½–6 inches long, blunt-pointed at both ends.—236. Roble blanco, "white-cedar", *Tabebuia heterophylla* (DC.) Britton.
          NN. Leaflets 5, ovate to elliptic, 4–8 inches long, long- or short-pointed at apex.—708. *Tabebuia rosea.**
        MM. Corolla dark red; leaflets 5 or 3, elliptic.—235. Roble cimarrón, *Tabebuia haemantha* (Bert.) DC.
  HH. Leaves pinnate or bipinnate.
    O. Leaves pinnate.
      P. Leaflets 5–13, lance-shaped to elliptic, saw-toothed, long-pointed; pod cigarlike but narrow, 4–8 inches long.—238. Roble amarillo, ginger-thomas, *Tecoma stans* (L.) H.B.K.
      PP. Leaflets mostly 11–17, elliptic, not toothed, abruptly short-pointed; pod lance-shaped or boat-shaped, 5–10 inches long.—234. Tulipán africano, African tuliptree, *Spathodea campanulata* Beauv.*
    OO. Leaves bipinnate, fernlike, pod round flattened, 2 inches long.—233. Jacaranda, *Jacaranda mimosifolia* D. Don.*

700. Roble dominicano, Haiti catalpa — *Catalpa longissima* (Jacq.) Sims*

This uncommon ornamental and shade tree is distinguished by its very long narrow pods 1–1½ feet long but less than ⅛ inch in diameter, which hang down in large numbers like wires. Other characters for identification are: (1) leaves 2–3 at a node, oblong to lanceolate, with a light green spot at the base of the blade above; and (2) the irregular flowers in spreading terminal clusters, opening 1 or 2 at a time, the corolla whitish with narrowly bell-shaped tube and 5 unequal spreading rounded wavy-margined lobes 1 inch across.

A large evergreen planted tree to 70 feet high and 2 feet in trunk diameter, perhaps larger in age. The trunk becomes slightly broad or buttressed at base and slightly angled and continues as a straight axis. Horizontal to slightly drooping branches form a narrow crown. Bark gray, rough, furrowed into narrow ridges, the inner bark light brown and bitter. The twigs are light green, becoming greenish gray, with raised light brown corky dots (lenticels). Young twigs and young leaves have minute whitish or brown dotlike scales visible with a lens. The bud is formed by minute young leaves.

The opposite and whorled leaves have slender light green petioles 1–1½ inches long, slightly enlarged at base. Blades are 2½–5 inches long and 1–2 inches wide, blunt or short-pointed at apex, rounded or blunt at base with a light green spot above, slightly thickened, slightly wavy at edges, the upper surface shiny green to dark green with few slightly sunken veins, and the

700. Roble dominicano, Haiti catalpa *Catalpa longissima* (Jacq.) Sims*

Flowering twig and fruit, two-thirds natural size.

lower surface dull light green with few prominent veins.

Flower clusters (panicles) are terminal, 3–4 inches long with slender spreading forks 2 inches across. Many flowers are produced, 1 or 2 opening at a time, not fragrant, the corollas shedding promptly and giving a whitish tinge to the ground beneath. A flower is composed of 2 half-round concave minutely pointed light green sepals 3/16 inch long, which split apart from a rounded bud; irregular corolla with narrowly bell-shaped light yellow tube 1/2 inch long, 2-lipped with 5 unequal whitish lobes; stamens 2 inside tube and inserted near base; and pistil with narrow 2-celled ovary, long style, and 2-lobed stigma.

One fruit is formed from a flower cluster. The wire-shaped pods (capsules) are dull green and straight; at maturity they become brown and in drying split longitudinally into 2 curving parts. There are many small brown seeds with 2 long narrow hairy wings totaling 3/8 inch long, bordered by whitish hairs more than 1/2 inch long. With flowers and fruits through the year.

The wood is light to pinkish brown with darker lines, heavy, easily worked, and durable. Local uses where the trees are native include carpentry, flooring furniture, boatbuilding, and general construction.

Rare as an introduced ornamental, shade, and forest tree in Puerto Rico and St. Thomas. In forestry, tested and promising on lower slopes of Luquillo Forest.

PUBLIC FOREST.—Luquillo.

RANGE.—Native of Hispaniola and Jamaica. Introduced in Lesser Antilles, southern Florida, and other tropical areas.

OTHER COMMON NAMES.—roble, roble de olor (Dominican Republic); Haiti catalpa (United States); Jamaica-oak, French-oak, mastwood, yokewood (Jamaica); chêne, chêne noir, bois chêne (Haiti); radégonde, chêne d'Amerique, chêne noir, poix doux marron (Martinique).

BOTANICAL SYNONYM.—*Macrocatalpa longissima* (Jacq.) Britton.

701. Higüerito — *Crescentia linearifolia* Miers

Higüerito, a small tree of dry coastal areas, is recognized by: (1) many slender straight spreading wandlike branches; (2) leaves crowded at nodes, very narrow, shiny, stiff, long-pointed and often spiny tipped; (3) greenish irregularly bell-shaped flowers 1 1/2–2 inches long, the tubular corolla with 5 wavy lobes; and (4) brown rounded or elliptic gourdlike fruits 1 1/4–2 inches long.

A small deciduous tree or shrub to 23 feet high and 8 inches in trunk diameter, with spreading thin crown of many slender straight spreading wandlike branches, hairless throughout. Bark light gray, rough and fissured, the inner bark light brown, fibrous, and tasteless. Twigs light gray brown, slender when young, becoming 1/4–1/2 inch in diameter, with enlarged nodes.

Leaves clustered at enlarged nodes, very narrow, linear to oblanceolate, 3/4–4 inches long and mostly 1/8–3/8 inch wide, sometimes to 1 inch, gradually narrowed and long tapering to very short petiole at base, not toothed on edges, slightly thickened, the upper surface green, and the lower surface light green.

Flowers single or few at upper nodes on short stalks less than 3/8 inch long, the flower buds green and rounded, 5/8 inch in diameter. The calyx is about 3/8 inch long, deeply splitting into 2–3 lobes; corolla tubular, irregularly bell-shaped, enlarged near base, 1 1/2–2 inches long and ending in 5 wavy lobes 1 1/2 inches across, green with narrow brown stripes; 4 stamens inserted in corolla tube in pairs; and pistil with 1-celled ovary, very slender style, and broad 2-lobed stigma. The flowers have an odor like rotten cabbage. The brown dry hard gourdlike fruits, which do not open, bear many seeds in the pulp. Flowering and fruiting irregularly through the year.

Scattered and locally common in dry coastal forest to 200 feet altitude, mainly in southern coastal Puerto Rico from Boquerón east to Salinas, also Cabezas de San Juan at the northeast corner and Piñeros near east end. Also St. Croix, St. Thomas and St. John.

PUBLIC FOREST AND PARK.—Guánica; Virgin Islands.

RANGE.—Hispaniola, Puerto Rico, and Virgin Islands.

OTHER COMMON NAMES.—higüerita (Puerto Rico); higüerito (Dominican Republic); calebasse marron (Haiti).

Higüerito is closely related to No. 232, the cultivated higüero or calabash-tree, *Crescentia cujete* L., which has very large rounded fruits 4–12 inches in diameter.

701. Higüerito

Crescentia linearifolia Miers

Twig with flower and fruit, natural size.

702. ***Crescentia portoricensis* Britton**

This rare vinelike shrub known only from western Puerto Rico sometimes becomes a small tree. It is distinguished by: (1) oblanceolate to narrowly elliptic, shiny, stiff and leathery leaves mostly clustered at nodes; (2) tubular irregularly bell-shaped yellowish white flowers 1¼–1½ inches long, borne singly; and (3) fruit cylindric, pointed, 3–4 inches long and 1–1¼ inches in diameter.

Evergreen vinelike shrub or sometimes a small tree to 20 feet high and 3 inches in trunk diameter, hairless. Bark light gray. Branches long and slender, light gray, with enlarged nodes, becoming fissured.

Leaves clustered at enlarged nodes or alternate, 2–6 inches long and ¾–3 inches wide, blunt to abruptly long-pointed at apex, tapering at base to petiole ¼–⅝ inch long, not toothed on edges, with prominent network of small veins. The upper surface is shiny green and the lower surface dull and paler.

Flowers single on slender stalks ⅜–¾ inch long. The calyx is ¾ inch long, deeply 2-lobed, the corolla tubular, irregularly bell-shaped, net-veined, with 5 broad entire lobes about ¼ as long as tube. The hard dry fruit is straight at base and does not split open.

Rare in lower Cordillera forest at 800–2,500 feet altitude in foothills of southwestern Puerto Rico.

PUBLIC FORESTS.—Maricao, Susúa.

RANGE.—Known only from western Puerto Rico.

Named by Nathaniel L. Britton in 1916 from his collection in 1913.

702. *Crescentia portoricensis* Britton

Twig with fruit, natural size.

703. Higüerita, black-calabash ***Enallagma latifolio*** **(Mill.) Small**

This small tree of lowlands near coasts resembles No. 232, higüero or calabash-tree, *Crescentia cujete*, L., in its flowers and fruits. It is characterized by: (1) leaves broadly elliptic to obovate, 3½–6 inches long and 2½–3 inches wide, thick and leathery, the apex rounded with abrupt short point; (2) large tubular light green flowers 1½–2 inches long and ¾ inch broad, borne singly; and (3) dark green fruits hard and egg-shaped or elliptic, 2½–4 inches long and 1½–2½ inches in diameter.

An evergreen small tree to 40 feet high and 1 foot in trunk diameter, hairless throughout. Bark gray, rough and furrowed, the inner bark light brown and slightly bitter. Twigs greenish to light gray, stout.

The alternate leaves with short petioles ¼ inch or less in length are sometimes crowded on short side twigs. The blades are commonly broadest beyond the middle, short-pointed at base, not toothed on edges, the upper surface dark green, slightly shiny, with veins sunken, and the lower surface dull light green with raised veins.

The few flowers are solitary at leaf bases on slender stalks about 1 inch long. The slightly fleshy green calyx covers the bud and splits into a bell-shaped tube ¾ inch long and 2 or 3 irregular lobes ⅝ inch long; the tubular bell-shaped corolla 1½–2 inches long, light green with 2-lipped wavy and iregularly toothed pink border, also a side fold; 4 stamens about 1 inch long in pairs and 1 shorter sterile stamen (staminode) inserted within the tube; and on a disk the whitish pistil with 1-celled ovary, long slender curved style, and 2-lobed stigma. The fruit (berry) resembles a small calabash or gourd, smooth, thin-walled, and fragile. The whitish pulp contains many blackish heart-shaped flattened seeds about ⅝ inch long, brownish within. Flowering irregularly during the year.

The wood is moderately hard and heavy, light brown or pinkish with orange tinge on exposure. Elsewhere it has been used for tool handles and plows.

Sometimes planted in Puerto Rico as an ornamental and for the seeds. The edible seeds are eaten and used like cacao or cocoa in a beverage, hence the local name cocoa. Elsewhere the pulp of the fruits has served in home remedies. The gourdlike fruits apparently are distributed along shores by ocean currents.

Uncommon in coastal swamps and moist forests at low altitudes near coasts back of mangroves and along streams at sea level around Puerto Rico. At base of sand dunes between Arecibo and Barceloneta. Also these and perhaps other smaller islands: Vieques, St. Croix, St. Thomas, and St. John.

PUBLIC FORESTS AND PARK.—Guajataca, Guánica; Virgin Islands.

RANGE.—Widespread in tropical America including Greater Antilles, Virgin Islands, Guadelupe, Dominica, Martinique, St. Vincent, and Trinidad. Also southern Florida and from southern Mexico south to Ecuador and Venezuela.

OTHER COMMON NAMES.—higüerillo, cocoa (Puerto Rico); higüero galión, güira cimarrona, higüero jamo, higüerillo (Dominican Republic); magüira, güira de olor (Cuba); cacao silvestre, calabasillo de la playa (Costa Rica); totumito, totumillo, wild-calabash (Panama); taparito, camuro (Venezuela); matesillo (Colombia); calabasillo (Colombia, Ecuador); black-calabash (United States); calabash (Trinidad); wild calabash, morito de río (British Honduras); calebasse zombie, calebasse marron (Haiti); calebasse ronde, calebasse, black-calabash (Dominica).

BOTANICAL SYNONYMS.—*Enallagma cucurbitina* (L.) Baill., *Crescentia cucurbitina* L.

703. Higüerita, black-calabash *Enallagma latifolia* (Mill.) Small

Twig with flower and fruit, two-thirds natural size.

704. Arbol de vela, candle-tree ***Parmentiera cerifera* Seem.***

Arbol de vela, or candle-tree, is a rare introduced ornamental tree with many cylindric white to yellow fruits resembling candles, hanging down from trunk and large branches. Other characteristics for identification are: (1) leaves opposite, with 3 leaflets and narrowly winged petiole; (2) large flowers irregularly bell-shaped, about 2½ inches long, borne mostly along trunk and larger branches, the tubular corolla whitish with pink streaks. No. 705, the related cuajilote, *Parmentiera edulis* DC., has similar foliage and flowers but has 2 (sometimes 1) short spines at some nodes and flowers borne mostly at ends of twigs, also shorter and broader fruits yellowish green to pinkish brown.

Small to medium-sized deciduous cultivated tree, reaching 30 feet in height and often with several trunks from the base to 6 inches in diameter, hairless. Twigs light gray, slender, ending in bud 1/16 inch long composed of several narrow scales. The bark is gray, smoothish to scaly and slightly fissured.

Leaves opposite or sometimes 3 or more on very short side twigs at nodes. Leaves 2–5 inches long, consisting of slender winged light green petiole ½–2 inches long and 3 stalkless leaflets 1–3 inches long and ½–1 inch wide, the central nearly twice as long as the 2 lateral. Leaflets obovate to elliptic, long-pointed at both ends, often toothed on edges, thin, dull light green, the lower surface paler and with tufts of hairs in vein angles along midvein.

The flowers are borne mostly along trunk and larger branches. The brownish calyx about 1 inch long splits to base on 1 side; the corolla tubular, irregularly bell-shaped, about 2½ inches long, whitish with pink streaks, with 5 large rounded lobes; 4 stamens in pairs inserted near base of tube; and pistil with 2-celled ovary, many ovules, long style, and 2-lobed stigma.

The distinctive white to yellow candlelike fruits are 1–2 feet or more in length and ¾–1 inch in diameter, smooth, fleshy, with odor like that of apples, berrylike and not splitting open. Seeds rounded, flat, less than ⅛ inch in diameter. Flowering and fruiting through the year.

Fruits of wild trees are recorded as generally 2–3 feet, not infrequently 4 feet long. These fruits have been used to fatten cattle. It is reported that cattle strip and eat the bark also.

Rare as an ornamental tree in Puerto Rico, for example, the Río Piedras area. Also planted in south Florida and elsewhere in the tropics, especially in botanical gardens.

RANGE.—Native of Panama, including Canal Zone.

OTHER COMMON NAMES.—palo de vela, árbol de cera (Puerto Rico); palo de vela, palo de cera (Spanish); wild calabash (Panama); candle-tree, Panama candle-tree (United States).

704. Arbol de vela, candle-tree *Parmentiera cerifera* Seem.*

Leafy twig, fruit, and flowers, two-thirds natural size.

705. Cuajilote ***Parmentiera edulis* DC.***

Cuajilote, sometimes planted as an ornamental, is easily recognized by: (1) 2 (sometimes 1) short spines at some nodes; (2) leaves opposite, with 3 leaflets and narrowly winged petiole; (3) large irregularly bell-shaped, flowers 1¾–2½ inches long, mostly single at ends of twigs, the tubular corolla greenish with purple streaks; and (4) fruit a cylindric berry 4–6 inches long and 1½–2 inches broad, with many angles and grooves, yellowish green to pinkish brown, suggesting a large pickle.

Small deciduous cultivated tree 15 feet high and 3 inches in trunk diameter, elsewhere larger, with broad crown and many spreading branches, hairless. Trunk sometimes angled, with scaly, fissured light gray bark. Inner bark pink to brown, fibrous. Twigs light gray with raised dots (lenticels), enlarged below leaf bases, ending in bud 1/16 inch long composed of several narrow scales. Some nodes have 2 (sometimes 1) slender straight sharp gray spines about ⅛ inch long.

Leaves opposite or sometimes appearing clustered or whorled on very short side twigs at nodes, 2–5 inches long, composed of slender winged light green petiole ½–2 inches long and 3 stalkless leaflets ¾–3 inches long and ⅜–1¼ inches wide, the central nearly twice as long as the 2 lateral. Leaflets obovate to elliptic, short-pointed at apex and short- to long-pointed at base, not toothed on edges, thin, the upper surface dull light green, and the lower surface dull lighter green, with minute holes and tufts of hairs in vein angles along midvein.

Flowers mostly single at ends of twigs on stalks ¾–1½ inches long. The green calyx is ¾–1¼ inches long, irregularly split to base on 1 side; corolla tubular, irregularly bell-shaped, 1¾–2½ inches long, greenish with purple streaks, with 5 large rounded lobes slightly unequal; 4 paired stamens and 1 sterile stamen inserted near base of tube; and on a disk the pistil with 2-celled ovary, many ovules, long style, and 2-lobed stigma. Berries hanging down, heavy, slightly flattened, 2-celled, with thick fibrous yellowish wall and many rounded flat yellowish seeds ⅛ inch in diameter. Flowering irregularly through the year.

The scientific name indicates that the fruits are edible. Where the trees are native and become common in pastures, livestock eat the fruits. The raw fruits seem inferior, being slightly bitter as well as fibrous. Elsewhere, they have been boiled or roasted or made into pickles or preserves.

The wood is described as whitish to pink and hard.

Introduced in recent years as an ornamental and not listed in Britton and Wilson (*10*). Rare in residential areas throughout Puerto Rico.

Occasionally planted in tropical countries for ornament and shade, also shade and food for livestock, and becoming naturalized. Grown in southern Florida. The fruits, leaves, and roots have served also in home remedies.

RANGE.—Native from Mexico to Guatemala and El Salvador.

OTHER COMMON NAMES.—cuajilote, guajilote (Mexico, Central America); chote, chachi, pepino de árbol (Mexico); food candle-tree (United States); cow-okra (British Honduras).

705. Cuajilote

Parmentiera edulis DC.*

Fruit (left), flowering twig (right), natural size.

706. Primavera — *Roseodendron donnell-smithii* (Rose) Miranda *

Primavera is one of the most spectacular ornamental large trees because of its masses of large golden-yellow flowers which cover the spreading trees when leafless. Distinguishing characters are: (1) opposite palmately compound (digitate) leaves with 5–7 (mostly 7) long-stalked ovate or elliptic leaflets 2–10 inches long and ¾–5 inches wide, long-pointed at apex and slightly notched at base, often wavy-toothed on edges, with sunken veins, becoming nearly hairless, at the end of a long petiole; (2) masses of large yellow flowers in crowded hairy clusters (panicles) to 8 inches long at ends of leafless stout twigs, deeply 2-lobed thin hairy calyx ⅝ inch long, with bell-shaped bright yellow corolla about 2 inches long ending in 5 rounded slightly unequal spreading lobes; and (3) seed capsules mostly 10–18 inches long and about 1 inch wide, rough, finely hairy, and with 10–12 longitudinal ridges, flattened, 2-celled, containing many flattened seeds bordered by a circular papery wing ¾ inch long. The light yellow or whitish wood, known as primavera in international commerce, is used especially for veneering, cabinetwork, furniture, and flooring. Introduced into Puerto Rico in recent years and still relatively uncommon, flowering in winter. RANGE.—Native of southern Mexico, Guatemala, El Salvador, and Honduras, but introduced in other tropical areas. OTHER COMMON NAMES.—primavera (Puerto Rico, Spanish, English); palo blanco (Mexico, Guatemala); copal (Guatemala); cortez, cortés, cortez blanco (El Salvador). BOTANICAL SYNONYMS.—*Tabebuia donnell-smithii* Rose, *Cybistax donnell-smithii* (Rose) Seibert.

707. Roble amarillo, yellow poui — *Tabebuia glomerata* Urban*

This introduced ornamental tree is noted for its solid masses of yellow tubular 5-lobed flowers about 2 inches long and broad, borne in winter when leafless. Other characters for recognition are: (1) opposite palmately compound leaves with 5 obovate to elliptic leaflets ending in a long narrow point; and (2) the narrow dark brown pods about 1 foot long and ⅜ inch wide, which split into 2 parts and curve irregularly, remaining on the tree.

Deciduous planted tree 30 feet high and 1 foot in trunk diameter, probably becoming larger, with spreading crown. The trunk has light brownish gray bark, with thin fissures, and the branches are gray and becoming fissured. Inner bark is light brown, fibrous, and bitter. Young twigs, petioles, and buds are covered with minute yellow-brown star-shaped hairs. The twigs are often flattened in last internode and become light gray and slightly fissured. Buds are formed by minute paired leaves, without scales or stipules. Some twigs end in a rounded cluster of many brown hairy flower buds ⅛ inch high and ⅜ inch across.

Leaves are opposite and palmately compound, without stipules. The slender rounded petioles are 2½–6 inches long, rounded and enlarged at base. The 5 spreading leaflets have slender stalks ⅜–1¼ inches long, grooved above. Blades of the leaflets are 2–7 inches long and 1–3 inches wide, the 2 outer smallest and the middle one longest, the base varying from rounded to slightly notched, thin, and slightly wavy at edges. The upper surface is green, dull to slightly shiny, almost hairless, with midvein and the curved side veins sunken. The lower surface is dull light green, with the prominent light yellow veins bearing minute star-shaped hairs.

Flower clusters are headlike at ends of twigs. Flowers many on stalks less than ¼ inch long, composed of cylindric rusty hairy calyx ⅜–½ inch long, unequally 5-lobed; corolla yellow funnel-shaped, about 2 inches long, with 5 unequal spreading rounded wavy lobes 2 inches across; stamens 4 in pairs and 1 sterile within corolla tube near base; and on a disk the pistil with 2-celled ovary, slender style, and 2-lobed stigma. The short-stalked pods have minute star-shaped hairs and thin walls. There are many thin light brown seeds with 2 whitish papery wings nearly 1 inch across. Flowering in February and other winter months.

The wood is light brown and soft.

Uncommon and occasionally planted for ornament in residential areas throughout Puerto Rico. The trees are very showy covered with golden flowers while leafless or nearly so.

RANGE.—Native of the southern West Indies from Grenada and St. Vincent to Trinidad and Tobago.

OTHER COMMON NAME.—yellow poui (Trinidad).

707. Roble amarillo, yellow poui *Tabebuia glomerata* Urban*

Flowers and leaf, two-thirds natural size.

708. Roble venezolano, pink trumpet-tree ***Tabebuia rosea*** **(Bertol.) DC.***

This handsome ornamental tree native of continental America has been introduced into Puerto Rico in recent years for its abundant large showy tubular flowers more than 2 inches long, pale pink or reddish purple, produced usually in late spring when leaves are absent. Other characters are: (1) opposite palmately compound (digitate) leaves with long petiole and 5 elliptic to ovate leaflets 4–8 inches long and 1½–2¾ inches wide; and (2) narrow pod-like brown fruits 8–12 inches long and ½ inch in diameter.

A large deciduous planted tree 70 feet high and 1½ feet in diameter, becoming somewhat larger in its native forests, with short erect trunk, slight buttresses, and rounded crown. The bark is gray or brown, thick, rough and deeply furrowed, the inner bark chocolate-colored. Twigs are stout and light gray.

The opposite leaves have petioles about 5 inches long, slightly flattened, light yellow green. The 5 slightly thickened leaflets with stalks ½–2 inches long have short or long point at apex, the base rounded or short-pointed, the borders not toothed, and minute scales on both surfaces, the upper green and slightly shiny, the lower dull light green.

Flower clusters (corymbs) are terminal, branched, and spreading, and bear several to many flowers on short stalks. The calyx ¾ inch long is bell-shaped with 4 teeth or 2 lobes, brownish green and minutely scaly; the corolla with shape of funnel or bell is pale pink or reddish purple, the tube whitish and yellow within, with 5 slightly unequal rounded lobes widely spreading 2–2½ inches across; 4 stamens in pairs and 1 shorter sterile stamen (staminode) inserted within the tube; and on a disk the yellow-green pistil with 2-celled ovary, slender style, and 2-lobed stigma. The pods (capsules) split open along 2 lines. There are many flattened seeds about 1½ inches across the 2 broad whitish wings. Flowering in late spring.

The yellowish or whitish sapwood turns pale brown on exposure. The heartwood is pale brown with fine dark lines. The wood is of medium weight (specific gravity 0.45–0.60), slightly soft, of medium texture to rough. It is easy to work, moderately durable, and takes a good polish. Locally it is used for posts and poles. Where this species is native, the wood is widely used for carpentry, furniture, interiors, flooring, doors and frames, construction, boat-building, tool handles, and boxes. It is reported that the bark is high in tannin content, also used in home remedies.

A popular ornamental and shade tree in cities of tropical America north to southern Florida. Planted also in the Old World tropics. Classed as a honey plant. This species is the national tree of El Salvador.

Uncommon as a planted ornamental tree in residential areas of Puerto Rico, becoming naturalized locally. A relatively recent introduction to Puerto Rico and not listed by Britton and Wilson (*10*).

RANGE.—Native from Mexico and Central America to Venezuela and Ecuador. Cultivated through the tropics.

OTHER COMMON NAMES.—roble (commerce, Spanish); roble blanco (Dominican Republic); macuil, maculiz prieto, palo de rosa, palo yugo, rosa morada, amapa rosa (Mexico); maculizo, mano de león (Guatemala, Honduras); cortés, roble blanco (Honduras); maculigua, maculez, macuilís (El Salvador); maculizo (Nicaragua); roble de sabana, roble blanco, guayacán (Costa Rica); roble de sabana (Panama); apamate, ocobo, roble morado (Colombia); apamate, roble negro (Venezuela); tabebuia, trumpet-tree, pink trumpet-tree (English); mayflower, maqueliz, macuelizo (British Honduras); pink poui (Trinidad).

BOTANICAL SYNONYMS.—*Tabebuia pentaphylla* auth., *Tecoma pentaphylla* auth.

708. Roble venezolano, pink trumpet-tree

Tabebuia rosea (Bertol.) DC.*

Two-thirds natural size.

709. Roble colorado ***Tabebuia schumanniana*** **Urban**

Roble colorado, known only from high mountains of Puerto Rico, is distinguished by: (1) opposite simple leathery leaves 2–6½ inches long and ¾–2¾ inches wide, broadest beyond middle (obovate or oblanceolate), with edges curved under, crowded on twigs; (2) few showy, slightly irregular flowers 1½–2 inches long, the bright red tubular corolla with 5 slightly unequal lobes; and (3) dark brown cigarlike pods 3½–7 inches long and ¼–⅜ inch in diameter.

A small evergreen tree to 40 feet high and 1 foot in trunk diameter. The bark is gray, fissured and becoming rough, slightly corky and soft, the inner bark whitish and bitter. Twigs are stout, slightly angled, green when young but becoming light brown, with tiny dark brown dotlike scales.

The crowded opposite simple leaves have short stout petioles ¼–¾ inch long. Blades are rounded or short-pointed at apex, gradually narrowed to the short-pointed or rounded base, edges curved under, with minute dark brown dotlike scales, above dark green with inconspicuous veins, and beneath pale yellow green.

Few to several flowers, sometimes 1, are borne at end of twigs on slender stalks ½–2 inches long. The tubular calyx is ⅜–¾ inch long, unequally 2- or 3-lobed, dark red, densely covered with brown dotlike scales; the bright red tubular corolla 1½–2 inches long has 5 unequal rounded lobes spreading 1–1½ inches across; stamens 4 in 2 pairs of different length, attached near base of corolla; and pistil on disk composed of 2-celled ovary, slender style, and 2-lobed stigma. The pods (capsules) with many dotlike scales split lengthwise in 2 parts. There are numerous thin brown elliptic seeds 1–1¼ inches long including the 2 whitish wings. Flowering and fruiting throughout the year.

The wood is light brown, hard, and heavy (specific gravity 0.9).

Common locally in dwarf and upper Cordillera forests at 2,800–4,390 feet altitude on peaks of western and central mountains of Puerto Rico east to Carite. Ascends to near summit of Cerro de Punta, the highest peak.

PUBLIC FORESTS.—Carite, Guilarte, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rican mountains.

OTHER COMMON NAMES.—roble de sierra, roble cimarrón (Puerto Rico).

The specific name honors Karl Moritz Schumann (1851–1904), German botanist.

This species is closely related to No. 237, roble de sierra, *Tabebuia rigida* Urban, which is known only from the Luquillo Mountains. Both have simple leaves and red flowers, while most species of this genus have palmately compound leaves with 3–5 leaflets. Another species, No. 235, roble cimarrón, *T. haemantha* (Bert.) DC., is confined to southern foothills and western mountains of Puerto Rico and is intermediate, having red flowers and palmately compound leaves.

709. Roble colorado

Tabebuia schumanniana Urban

Flowering twig (above), fruit (below), natural size.

GESNERIA FAMILY (GESNERIACEAE)

Herbs and shrubs, rarely trees, known by: (1) leaves alternate or opposite, often leathery or hairy, often toothed; (2) flowers showy, solitary or clustered at leaf bases or terminal, bisexual, irregular, composed of 5-lobed calyx, 5-lobed tubular corolla bell-shaped, funnel-shaped, or wheel-shaped, mostly 2-lipped, stamens 4 in pairs or 2 inserted within corolla, and pistil with superior or inferior ovary 1-celled with 2 parietal placentas and many ovules, slender curved style, and stigma often 2-lobed; and (3) fruit usually a capsule with many minute seeds. One native tree species.

710. Arbol de navidad — *Gesneria pedunculosa* (DC.) Fritsch

The gesneria family is a tropical group of herbs and shrubs, including several ornamentals, such as African-violet (*Saintpaulia*). The occurrence of a species of large shrub sometimes reaching the size of a small tree and confined to Puerto Rico is unexpected. This unusual tree is recognized by: (1) shiny dark green elliptic leaves 2–4½ inches long and ¾–1¾ inches wide, the edges often with minute wavy teeth; (2) flowers 1–4 more than 1 inch long at the end of a very long slender erect stalk of 3½–7 inches, the irregular bell-shaped whitish corolla with 5 unequal blunt lobes, the 2 upper largest, and with 4 long stamens; and (3) bell-shaped brown to gray seed capsules about ¼ inch long and broad, with 5 long narrow calyx lobes pointed upward.

An evergreen shrub mostly 10–15 feet high, with several spreading stems from base mostly 1 inch in diameter, sometimes a small tree. The light gray or brown bark is much furrowed and rough, the inner bark light brown, fibrous, and tasteless. Twigs are greenish to gray, slender, hairless.

The leaves are alternate but crowded at ends of twigs, hairless, with petioles ¼–⅝ inch long. Blades are thin or slightly thickened, short- or long-pointed at apex, short-pointed at base, the edges slightly turned under and often with minute wavy teeth, the upper surface dark green, and the lower surface light yellow green.

The flowers borne at the end of a very long stalk are composed of greenish conical base (hypanthium) 3/16 inch long, which bears 5 narrow greenish calyx lobes ¼–⅜ inch long and the other parts; the irregular 2-lipped bell-shaped corolla ¾ inch long including 5 unequal blunt lobes, the 2 upper largest, whitish, yellowish, greenish, or mottled and purplish; 4 threadlike curved stamens about 1½ inches long, attached at base of corolla and extending beyond; and pistil with inferior 1-celled ovary, many ovules, long curved style, and enlarged blackish stigma. The capsules split along 4 lines and contain many very small reddish brown seeds. Flowering and maturing fruits nearly through the year. Pollinated probably by bats that feed upon the flowers.

The wood is light brown and hard.

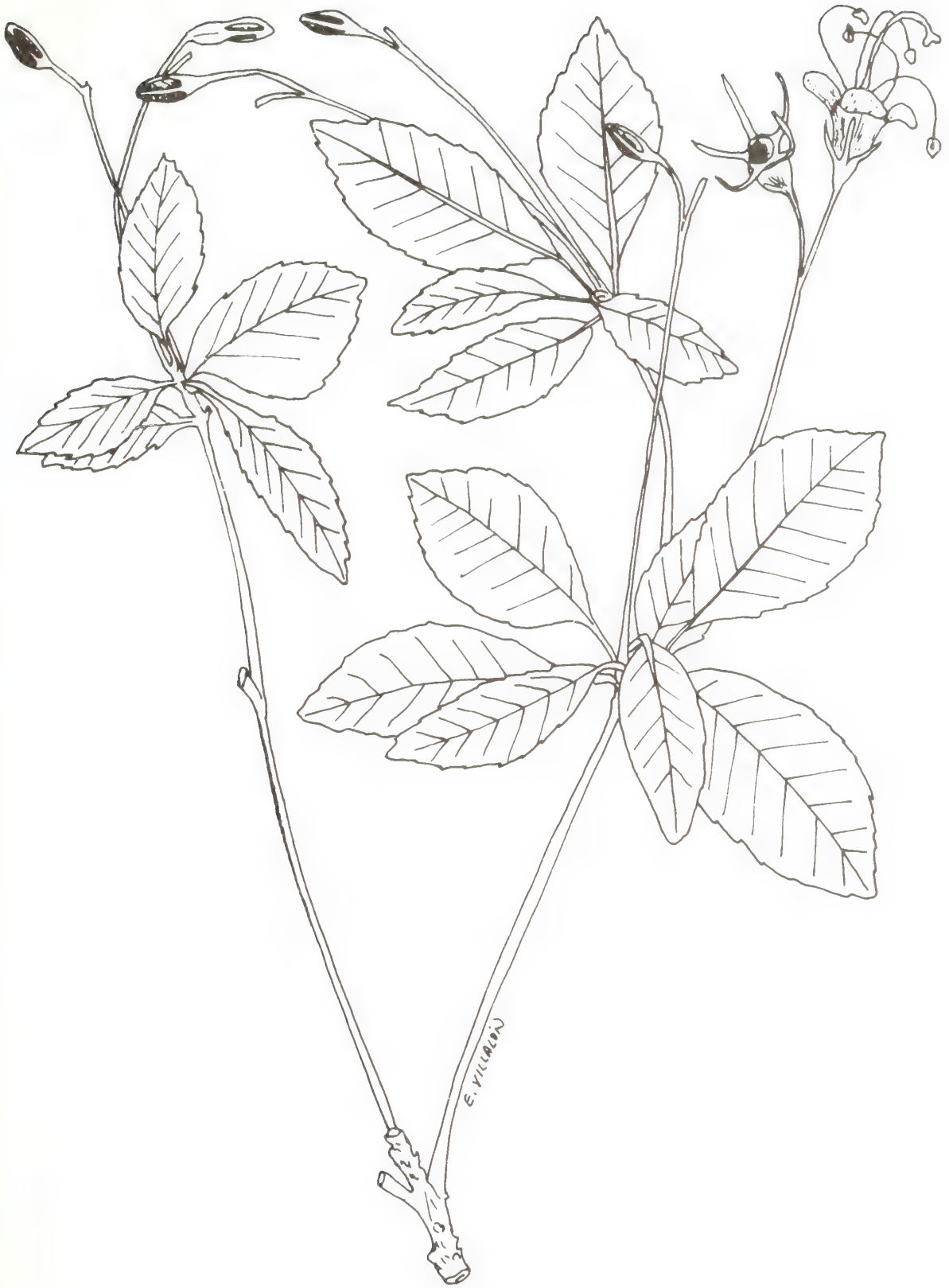
Scattered but widely distributed in moist and dry forests at low and middle altitudes in Puerto Rico.

PUBLIC FOREST.—Susúa.

RANGE.—Known only from Puerto Rico.

BOTANICAL SYNONYMS.—*Gesneria albiflora* (Decne.) Kuntze, *Pentarhaphia albiflora* Decne.

The generic name honors the Swiss naturalist and physician Conrad Gesner (1516–1565).



710. Arbol de navidad

Gesneria pedunculosa (DC.) Fritsch

Natural size.

MYOPORUM FAMILY (MYOPORACEAE)

Shrubs or sometimes trees, mostly Old World, represented by *Bontia,* known by: (1) leaves alternate or opposite, simple, entire, without stipules; (2) flowers solitary or in clusters (cymes) at leaf bases, bisexual, irregular, consisting of 5-lobed persistent calyx, 5-lobed 2-lipped tubular corolla, stamens 4 in pairs inserted inside tube, and pistil composed of superior ovary 2-celled or sometimes 3–10-celled by false partition with 2–8 ovules in each cell, slender style, and stigma; and (4) fruit a berry or drupe with few seeds. One tree species.

711. Mangle bobo, white-alling — *Bontia daphnoides* L.

This shrub or small tree local on shores is sometimes found with mangroves and known by the corresponding Spanish name mangle. It is recognized by: (1) large dark green gland dots on young twigs, foliage, flowers, and fruits, giving an odor when crushed; (2) numerous crowded lance-shaped or narrowly oblong leaves slightly thick and fleshy, without visible side veins; (3) curved irregular tubular flowers ¾–⅞ inch long, the light yellow corolla with purplish spots; and (4) egg-shaped pointed stone fruit ⅝ inch long and ½ inch across, resembling an olive.

Evergreen shrub or small tree 10–20 feet high and to 6 inches in trunk diameter, nearly hairless throughout. The bark is light brown, thick, rough, and furrowed. Inner bark is light brown, bitter and pungent. The light green twigs, becoming brown, end in a very narrow pointed bud ¾ inch long, composed of rolled young leaves without stipules.

The numerous alternate crowded leaves have broad petioles ¼–½ inch long. Blades are 2–3½ inches long and ⅝–⅞ inch wide, long-pointed at both ends, not toothed on edges, dull pale green on both surfaces, with many gland dots mostly small but few large, visible against the light with a lens.

Curved irregular flowers are borne singly at leaf bases on slender stalks ½–¾ inch long, enlarged at apex. The calyx ⅛ inch long has 5 narrow-pointed hairy-edged teeth; the tubular corolla ¾–⅞ inch long has a cylindric tube and 2 unequal lips or lobes purplish hairy within, the lower lip shorter and much rolled backward; stamens 4, inserted in pairs near base of tube and extending beyond; and pistil consists of conic green ovary, 2-celled with 4 ovules in each cell, and threadlike long style.

The stone fruits (drupes) turning from yellow green to light green at maturity, have calyx remaining at base and short point at apex from base of style, thin yellow slightly bitter flesh, a large whitish thick-walled stone, and few whitish seeds less than ⅛ inch long. Flowering and fruiting through the year.

The wood is light gray brown, hard and heavy, fine-textured, with fairly straight grain, and with faint spicy odor, without special use.

Plants are grown for ornament, in hedges, and as windbreaks. Being tolerant of salt, they are common around houses on sandy shores of Guyana. Cultivated also at higher altitudes to 5,000 feet or more in the northern Andes of Venezuela. Also escaping from cultivation and becoming naturalized.

In coastal forests, shores, and salty flats at sea level, mostly local, uncommon, and scattered, but spread by planting. With mangroves and No. 28, uva de playa, seagrape, *Coccoloba uvifera* (L.) L. In Puerto Rico known from the dry southern and southwestern part, for example, between Salinas and Santa Isabel, at Playa El Tuque and Cabo Rojo, and Palominos Island at the northeastern end. Also Vieques, St. Thomas, St. John, and Tortola, and reported long ago from St. Croix.

PUBLIC PARK.—Virgin Islands.

RANGE.—Bahamas, Cuba, Hispaniola, Puerto Rico, and Virgin Islands. Through Lesser Antilles from St. Martin, Barbuda, and Antigua to Grenada, Barbados, and Trinidad. Also native or introduced along northern coast of South America from Aruba, Curacao, and Bonaire and Venezuela to Guyana. Planted and becoming naturalized beyond.

OTHER COMMON NAMES.—manzanilla, mangle (Puerto Rico); white-alling, alling (Virgin Islands); aceituna americana, olivo bastardo (Cuba); aceituno (Dominican Republic); olivo (Dominican Republic, Venezuela); Barbados-olive, olive (Bahamas); wild olive (Barbados); olivier batârd, mang blanc (Haiti); olivier bord de mer (Martinique); oliba, olijfi (Dutch Antilles).

This species has special botanical interest as the only New World representative of a small Old World family of 5 genera and about 100 species, mostly shrubs and few trees. The center of distribution is Australia and nearby islands. Hawaii has 1 tree species. It has been suggested that *Bontia* possibly might have been introduced long ago.

711. Mangle bobo, white-alling

Bontia daphnoides L.

Natural size.

MADDER FAMILY (RUBIACEAE)

Shrubs and trees sometimes large, also herbs and vines, known by: (1) leaves opposite, sometimes whorled, simple, entire with paired stipules that form bud and leave ring scars at nodes; (2) flowers generally many in cymes, small to large, bisexual, regular, with 5–4-lobed calyx often persistent, tubular corolla usually 5–4-lobed, generally colored and often showy, stamens 5–4 alternate and inserted in tube, and pistil with inferior ovary commonly 2-celled and containing many ovules (to 1), style, and 2 stigmas; and (3) fruit a capsule or berry, sometimes a drupe. Also vol. 1, p. 504.

Key to species

A. Plants spiny or sticky (viscid).
  B. Plants spiny.
    C. Twigs with spines, mostly paired.
      D. Leaves and spines paired; leaves ⅜–1¾ inches long; side twigs short in 4 rows—247. Tintillo, box-briar, *Randia aculeata* L.
      DD. Leaves and spines partly in 3's; leaves ¼–⅝ inch long; twigs long and slender—733. *Machaonia portoricensis.*
    CC. Spines at end of stiff leaves—729. *Guettarda pungens.*
  BB. Plants sticky (viscid) or resinous.
    E. Buds not resinous—713. *Antirhea acutata.*
    EE. Buds in resin drop.
      F. Flowers in terminal clusters—719. *Chione seminervis.*
      FF. Flowers in lateral clusters.
        G. Flowers crowded on 2 forks at end of long lateral stalk—249. Aquilón, *Terebraria resinosa* (Vahl) Sprague.
        GG. Flowers crowded at leaf bases and back of leaves.
          H. Leaves ¾–1¾ inches long—740. *Phialanthus myrtilloides.*
          HH. Leaves 1–3½ inches long—739. *Phialanthus grandifolius.*
AA. Plants not spiny or sticky (viscid).
  I. Flowers many in compact white terminal clusters 2–4 inches across, suggesting a snowball or with rounded stalked white lobes to 1¼ inches in diameter; introduced ornamentals.
    J. Flower clusters suggesting a snowball—732. *Ixora thwaitesii.**
    JJ. Flower clusters with rounded stalked lobes—718. *Calycophyllum candidissimum.**
  II. Flowers not suggesting a snowball, if white then in smaller clusters.
    K. Fruit a capsule with many seeds, splitting open.
      L. Flowers large, with long narrow tube and lobes from bud more than 1¾ inches long.
        M. Leaves 4–8½ inches long.—724. *Exostema sanctae-luciae.*
        MM. Leaves less than 3½ inches long.
          N. Flowers many in terminal clusters—723. *Exostema ellipticum.*
          NN. Flowers single at leaf bases—241. Albarillo, Caribbean princewood, *Exostema caribaeum* (Jacq.) Roem. & Schult.
      LL. Flowers small, less than ½ inch long.
        O. Leaves 3–7 inches long; flowers several to many in branched lateral clusters—248. Juan tomás, *Rondeletia portoricensis* Krug & Urban.
        OO. Leaves small, mostly less than 3 inches long; flowers few or 1 on short stalks at leaf base.
          P. Twigs and lower leaf surfaces with long soft hairs—747. *Rondeletia pilosa.*
          PP. Twigs and lower leaf surfaces slightly hairy or nearly hairless—746. *Rondeletia inermis.*
    KK. Fruits dry or fleshy, not splitting open.
      Q. Fruits (drupes) becoming hard and dry.
        R. Fruits hairless, black, rounded but broader than long, 1-seeded; flowers on slender stalks; leaves becoming blackish upon drying—242. Cafeíllo, false-coffee, *Faramea occidentalis* (L.) A. Rich.
        RR. Fruits finely hairy, green, red, or black, rounded, with several seeds; flowers several clustered erect on forks at end of long stalk—*Guettarda.*
          S. Leaves rough on upper surface—244. Palo de cucubano, "greenheart," roughleaf velvetseed, *Guettarda scabra* (L.) Vent.
          SS. Leaves smooth and hairless on upper surface.
            T. Leaves hairy on lower surface.
              U. Leaves thick, the lower surface soft hairy with network of raised veins—726. *Guettarda krugii.*
              UU. Leaves thin, the surface with minute pressed hairs—725. *Guettarda elliptica.*

TT. Leaves hairless or nearly so on lower surface.
V. Leaves with deeply sunken side veins—727. *Guettarda ovalifolia.*
VV. Leaves with side veins not or slightly sunken.
W. Leaves 1½–5 inches long, dull dark green—730. *Guettarda valenzuelana.*
WW. Leaves ¾–2¼ inches long, shiny yellow green—728. *Guettarda parviflora.*

QQ. Fruits fleshy berries or drupes.
X. Fruits compound, from many flowers crowded in ball-like head; leaves large, elliptic, mostly 6–12 inches long.
Y. Flowers orange, in balls 1¼–1½ inches across—712. *Anthocephalus chinensis.**
YY. Flowers white, in balls 1 inch across—246. Morinda, painkiller, *Morinda citrifolia* L.*
XX. Fruits simple, each from a flower; leaves mostly smaller.
Z. Seeds few to many.
a. Fruits large, more than 1 inch wide.
b. Fruit elliptic, 3½–4½ inches long, with bluish dye, sour; leaves drying dark bluish green—243. Jagua, genipa, *Genipa americana* L.
bb. Fruit round, 1¼ inches in diameter—748. *Vangueria madagascariensis.**
aa. Fruits less than ½ inch long.
c. Berry elliptic, dark red to blackish; flowers orange red to red; leaves mostly in 3's—731. *Hamelia patens.*
cc. Berry or drupe black; flowers whitish; leaves opposite.
d. Flowers and fruits several to many, short-stalked at ends of branching clusters; fruits round, 3/16 inch in diameter, with 5–10 grooves and nutlets—722. *Erithalis fruticosa.*
dd. Flowers and fruits clustered erect on forks at end of long stalk; fruits elliptic or oblong, about ⅜ inch long, the stone with 2–6 cells and seeds—*Antirhea.*
e. Leaves oblong to lanceolate, 3–4 times as long as wide—717. *Antirhea sintenisii.*
ee. Leaves mostly elliptic or ovate, mostly 2–3 times as long as wide.
f. Leaves shiny green above, the lower surface with several tiny holes in angle between side veins and midvein—715. *Antirhea lucida.*
ff. Leaves dull green, slightly thickened.
g. Leaves almost stalkless, rounded to heart-shaped at base—239. Quina, *Antirhea obtusifolia* Urban.
gg. Leaves with short petiole, blunt or short-pointed at base.
h. Petiole ¼–⅝ inch long; fruit with 2-seeded stone—714. *Antirhea coriacea.*
hh. Petiole ⅛–5/16 inch long, stout; fruit with 4-celled stone—716. *Antirhea portoricensis.*

ZZ. Seeds or nutlets 2, from 2-celled ovary.
i. Flowers clustered at leaf bases and nodes back of leaves, short-stalked.
j. Flowers more than 1 inch across the 5–7 spreading white corolla lobes; elliptic red berries with 2 large brown seeds (coffee beans)—*Coffea.*
k. Leaves 3–7 inches long; corolla 5-lobed—240. Café, coffee, *Coffea arabica* L.*
kk. Leaves 6–14 inches long; corolla 5–7-lobed—721. *Coffea dewevrei.**
jj. Flowers ½ inch long, the corolla with very narrow reddish or pink tube and 4–5 short white lobes; rounded red or pink berries—245. Cafeíllo, *Ixora ferrea* (Jacq.) Benth.
ii. Flowers in terminal branched clusters.
l. Flower clusters with whitish axis; fruit (drupe) oblong, ½–¾ inch long, shiny purplish black with 2-celled stone; stipules shedding early—720. *Chione venosa.*
ll. Flower clusters with greenish or reddish axis; fruit (drupe) rounded, about ¼ inch long, black, bluish, or red, with 2 nutlets; paired pointed stipules present.
m. Corolla with long tube ⅜–¾ inch long, slightly curved and swollen at base, mostly yellow or red; axis orange or reddish; fruits black—*Palicourea.*
n. Stipules deciduous; flowers nearly stalkless in clusters of 3, corolla white or pinkish—737. *Palicourea domingensis.*
nn. Stipules persistent; flowers separate on slender stalks.
o. Leaves less than 4 inches long; corolla yellow, turning to pale purple—734. *Palicourea alpina.*
oo. Leaves mostly 4–10 inches long.
p. Corolla white—735. *Palicourea barbinervia.*
pp. Corolla yellow or red.
q. Corolla yellow; flowers on orange-red branches of clusters about as broad as long, often more or less horizontal; leaves with small tufts of hairs where side veins join midvein beneath—738. *Palicourea riparia.*
qq. Corolla red; flowers on yellow or orange branches of erect clusters longer than wide; leaves minutely hairy along midvein beneath—736. *Palicourea crocea.*

mm. Corolla with short straight tube less than ⅜ inch long, mostly white; axis greenish; fruits black or red—*Psychotria.*
r. Leaves thin, with straight edges.
s. Leaves long- or short-pointed at apex, mostly more than 4 inches long.
t. Leaves obovate or broadly oblanceolate, widest beyond middle, mostly 8–13 inches long—742. *Psychotria grandis.*
tt. Leaves elliptic, widest at middle, 3–8 inches long—741. *Psychotria berteriana.*
ss. Leaves blunt- or short-pointed at apex, less than 4 inches long; Mona Island only—745. *Psychotria nutans.*
rr. Leaves slightly thickened and turned under at edges.
u. Leaves elliptic to obovate, broadest near blunt-pointed apex and narrowed to long-pointed base; foliage without odor—744. *Psychotria maricaensis.*
uu. Leaves oblong, widest near middle, long- or short-pointed at both ends; foliage with bad odor—743. *Psychotria maleolens.*

712. Kadam *Anthocephalus chinensis* (Lam.) A. Rich. ex Walp.*

Kadam, a rapidly growing introduced timber tree, is being tested experimentally in forestry plots in Puerto Rico. It is distinguished by: (1) opposite large elliptic yellow-green leaves with many sunken curved side veins; (2) orange flowers crowded in large balls or heads 1¼–1½ inches in diameter; and (3) fleshy fruits in balls about 2 inches in diameter.

A large evergreen introduced forest tree becoming at maturity 100 feet tall and 2½ feet in trunk diameter, with straight axis and widely spreading nearly horizontal branches. Bark gray, smoothish to slightly fissured. The inner bark is light yellow with a thin green outer layer, fibrous, and bitter. Twigs stout, hairless, with ringed nodes, green when young, becoming brown. Buds very narrow and long-pointed, ⅝ inch long, covered by paired stipules, which shed early.

Leaves opposite, hairless, with stout light green petioles 1¼–1¾ inches long. Blades are 6–12 inches long and 3¼–8 inches wide, abruptly short-pointed at apex, rounded at base, not toothed on edges, slightly thickened and leathery, the upper surface yellow green and slightly shiny, the midvein and curved side veins light yellow and sunken, and the lower surface dull light green with raised veins.

Flowers numerous, fragrant, consisting of tubular base (hypanthium) ⅛ inch long, which bears the 5-lobed calyx and other parts; corolla ⅜ inch long, narrowly funnel-shaped with 5 elliptic lobes ¼ inch across; 5 stalkless stamens on throat of corolla and alternate with lobes; and pistil with inferior 2-celled ovary, long threadlike style, and enlarged stigma.

Fruits compound (multiple), composed of numerous crowded fruits pressed together in a fleshy ball around the central whitish base nearly 1 inch across. Each individual fruit about ⅜ inch long and ⅛ inch wide has 5 or sometimes 4 short brownish lobes 1/16 inch long from a fleshy base and inferior ovary. There are 4 or fewer light brown seeds more than 1/16 inch long. Flowering in spring and summer, maturing fruits in summer and autumn.

The wood is light in color and workable, suited especially for veneers and cabinetwork. It has not yet been used locally.

Kadam is uncommon in Puerto Rico. This promising, very fast growing tree is planted mainly for timber but sometimes for ornament such as in plazas.

PUBLIC FORESTS.—Luquillo, Maricao, Río Abajo.

RANGE.—Native of southeast Asia to East Indies and Philippines but planted as a forest tree and in botanical gardens in other tropical countries.

OTHER COMMON NAMES.—kadam (commerce); laran (Malay).

BOTANICAL SYNONYM.—*Anthocephalus cadamba* (Roxb.) Miq.

712. Kadam *Anthocephalus chinensis* (Lam.) A. Rich. ex Walp.*

Flowering twigs (left), fruiting twig (right), two-thirds natural size.

713. Quina ***Antirhea acutata*** **(DC.) Urban**

This shrub or small tree is easily recognized by its small sticky or viscid, shiny yellow-green leaves. Other characters for identification include: (1) erect long slender wiry gray twigs, mostly paired, with many crowded, slightly raised, half-round to round leaf scars; (2) leaves opposite and crowded at ends of twigs, elliptic to oblong, mostly ¾–1½ inches long and ⅜–⅝ inch wide; (3) few very fragrant small white narrowly tubular flowers ⅜–⅝ inch long borne erect in a line at end of short stalk from leaf base; and (4) small elliptic black fleshy fruits 3/16 inch long.

Evergreen much branched shrub or small tree to 15 feet high and 3 inches in trunk diameter, reported to reach 25 feet, often with several trunks from base. The bark is blackish gray, smoothish, becoming thick, rough and shaggy, with short scaly plates. Inner bark is pinkish brown and bitter. The twigs, finely hairy when young, have faint rings at nodes. Older twigs have corky outgrowths.

The leaves have light yellow finely hairy leafstalks 1/16–⅛ inch long and blades sometimes to 2 inches long and ¾ inch wide. Paired narrow pointed brown stipules ⅛ inch or more in length leave a faint ring scar but persist sometimes on twigs after leaves fall. Blades are sticky or viscid, shiny yellow green, paler beneath, thin or slightly thickened, short-pointed at apex, short-pointed or rounded at base, slightly turned under at edges, hairless.

Flower clusters (cymes) bear few nearly stalkless fragrant flowers erect on one side of the end of a slender stalk ½–1 inch long, which arises at base of a leaf. The flower is composed of short tubular yellow-green calyx 1/16 inch long, with 5 long teeth; white corolla ⅜–⅝ inch long, with very narrow tube and 5 spreading lobes 3/16–¼ inch across; 5 stamens inside throat of tube and alternate with lobes; and pistil with inferior 4–6-celled ovary and slender style. The fruits (drupes) bear the calyx at apex and contain few seeds within the 4–6-celled stone. With flowers and fruits through the year.

The wood is light brown, slightly hard.

Common in dry limestone and lower Cordillera forests, also shrub thickets along beaches, from sea level to 800 feet altitude, from Guayanilla west to the southwestern corner of Puerto Rico. Also Mona, Muertos, and Vieques.

PUBLIC FORESTS.—Boquerón, Guánica, Susúa.

RANGE.—Puerto Rico, Lesser Antilles from Anguilla, St. Barts, and Barbuda to Guadeloupe and Marie Galante, and Bonaire, Curacao, and Aruba.

OTHER COMMON NAMES.—boje, manglillo (Puerto Rico); cuchara, placa chiquita, stanibari (Dutch Antilles).

BOTANICAL SYNONYM.—*Stenostomum acutatum* DC.

The generic name has been spelled also *Antirrhoea*.

713. Quina

Antirhea acutata (DC.) Urban

Natural size.

714. Quina ***Antirhea coriacea*** **(Vahl) Urban**

This tree, scattered in moist mountains and along the north coast of Puerto Rico, has: (1) opposite elliptic or ovate leaves 2–5 inches long and 1¼–2½ inches wide, slightly thickened, dull green; (2) several to many flowers ⅜ inch long, the white corolla with slender tube and 4 short lobes, erect in few-branched clusters; and (3) oblong or elliptic black fruit ⅜ inch long.

Evergreen tree to 40 feet tall and 8 inches in trunk diameter. Twigs hairless, with rings at nodes.

The opposite hairless leaves have leafstalks ¼–⅝ inch long. The paired oblong stipules are ¼–5/16 inch long. Blades are slightly thickened, the apex blunt or abruptly long-pointed, the base blunt or short-pointed, with 5–6 pairs of side veins, prominent on under surface.

Flower stalks (cymes) arising from leaf base have slender stalk and few branches 1¼–2 inches long, shorter than leaves. The fragrant flowers have a short tubular calyx 1/16 inch long with 4 very short teeth; corolla 5/16 inch long, the narrow tube much longer than the 4 lobes; 4 stamens inside throat of tube and alternate with lobes; and pistil with inferior 2-celled ovary and threadlike style. The fruit (drupe) has a 2-seeded stone. Bearing flowers in spring and fruits in summer.

The wood is described as yellowish, hard, heavy, and durable. Elsewhere it has served for posts and construction and the bitter bark in home remedies.

Scattered and uncommon in moist coast, limestone, and lower Cordillera forests at 200–2,500 feet altitude on moist mountains and along the north coast of Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo, Maricao, Río Abajo.

RANGE.—Jamaica, Puerto Rico, Montserrat, Guadeloupe, Dominica, Martinique, and St. Vincent.

OTHER COMMON NAMES.—boje (Puerto Rico); pegwood (Jamaica); mapou noire (Guadeloupe, Martinique); bois jaune (Guadeloupe, Dominica); bois nigresse (Guadeloupe); acouquoi (Dominica).

BOTANICAL SYNONYM.—*Stenostomum coriaceum* (Vahl) Griseb.

714. Quina

Antirhea coriacea (Vahl) Urban

Fruiting twig (above), flowering twig (below), natural size.

715. Palo llorón ***Antirhea lucida*** **(Sw.) Benth. & Hook. f.**

Palo llorón is distinguished by: (1) opposite leaves with faint lateral veins not distinct near margins, 1 or 2 pairs at end of light gray twig; (2) flower cluster (cyme) 3–5 inches long, consisting of 2 nearly horizontal, curved very slender, light green branches bearing on upper side many small erect stalkless light yellow and greenish tubular flowers nearly ¼ inch long; and (3) oblong fruit (drupe) ¼–⅜ inch in length, red to black.

A small deciduous tree 15–30 feet tall and 8 inches in trunk diameter, with spreading crown of smooth light gray branches, or a shrub, hairless almost throughout. The light bark is smooth with many dots (lenticels). Inner bark is light brown, turning darker on exposure, slightly bitter. Twigs are light gray, with faint rings at nodes. Young tips of twigs are green with a pointed bud about ¼ inch long formed by stipules, which are ¼ inch long, long-pointed, and shed very early.

The opposite leaves have leafstalks ¼–⅜ inch long and blades 3–6 inches long and 1½–2¾ inches wide. Blades are short-pointed at base, short-pointed or rounded at apex, shiny green above and beneath light green and less shiny. On lower surface several tiny depressions or holes are formed in the angle between a lateral vein and midrib.

Each small flower has a green basal tube (hypanthium) 1/16 inch long and broad, enclosing the inferior 2-celled ovary; green tubular calyx 1/16 inch long, minutely 5–4-lobed at apex; light yellow corolla with tube about ⅛ inch long and 5–4 spreading lobes nearly ¼ inch across, the tube bearing as many minute brown stamens as lobes; and light yellow style nearly 3/16 inch long with 2-lobed stigma. The 2-seeded fruit retains calyx at apex. With flowers in spring and fruits in summer.

The wood is light brown and hard.

Common locally in dry limestone, moist coastal, and moist limestone forests from sea level to 800 feet altitude in southwestern Puerto Rico near Guayanilla, Guánica, and Parguera and east along north coast to Toa Baja. Also islands eastward to St. Thomas and St. Croix.

PUBLIC FORESTS AND PARK.—Guánica, Susúa; Buck Island Reef.

RANGE.—Bahamas, Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, Lesser Antilles in St. Barthélemy, Guadeloupe, St. Lucia, and Trinidad, and Dutch West Indies (Aruba, Bonaire, Curacao).

OTHER COMMON NAMES.—aguacatillo, palo de cuello, palo de gallina (Dominican Republic); llorón, raizú, almorrana, almorrana amarilla (Cuba); avocat marron, bois patate (Haiti); koetsjaara, plaaka sjikietoe (Dutch Antilles).

BOTANICAL SYNONYM.—*Stenostomum lucidum* (Sw.) Gaertn. f.

715. Palo llorón *Antirhea lucida* (Sw.) Benth. & Hook. f.

Flowering twig (above), fruiting twig (lower right), natural size.

716. ***Antirhea portoricensis*** **(Britton & Wils.) Standl.**

This rare small tree 20–30 feet high and 4 inches in trunk diameter is distinguished from related species by: (1) opposite elliptic leaves 2½–5 inches long and 1–2½ inches wide, dull and slightly thickened, with stout petiole ⅛–5/16 inch long; (2) flower clusters (cymes) with slender branches ⅝–1⅜ inches long; and (3) elliptic fruit (drupe) 5/16 inch long and ¼ inch in diameter, 4-celled. Rare in moist limestone forest at 200–400 feet altitude in northern Puerto Rico.

BOTANICAL SYNONYM.—*Stenostomum portoricense* Britton & Wils. Named in 1930 from a specimen collected the year before by N. L. Britton at Candelaria, west of Bayamón. A poorly known species meriting further study.

717. Quina ***Antirhea sintenisii*** **Urban**

A tree confined to moist parts of Puerto Rico and characterized by: (1) opposite oblong to lanceolate leaves 2–4½ inches long and ⅝–1¼ inches wide; (2) several flowers nearly ⅜ inch long, the cream-colored corolla with narrow tube and 4 short lobes, stalkless along the end of a short stalk from base of leaves; and (3) elliptic fruit ⅜ inch long.

Evergreen tree reported to reach 50 feet in height. Twigs slender, brown or gray brown, hairless, with rings at nodes.

The opposite hairless leaves have leafstalks 3/16–⅜ inch long and paired ovate stipules ¼ inch long. Blades are slightly thickened, the apex blunt, rounded, or short-pointed, the base mostly short-pointed, the midvein prominent but side veins very obscure.

Flower clusters (cymes) from base of leaf have branches ⅝–1¼ inches long bearing several stalkless flowers. The flowers are composed of short tubular calyx 1/16 inch long with 4 short broad teeth; cream-colored hairy corolla ¼ inch long, the tube much longer than the 4 lobes; 4 stamens inside throat of tube and alternate with lobes; and pistil with inferior ovary, threadlike style, and 2-lobed stigma. The fruit (drupe) is black at maturity. Collected with flowers and fruits in January.

The wood is described as yellowish.

Rare in moist forest at lower and middle altitudes in Puerto Rico. Collected near Utuado, Manatí, and Guajataca. Not found by the authors.

RANGE.—Known only from Puerto Rico.

BOTANICAL SYNONYM.—*Stenostomum sintenisii* (Urban) Britton & Wils.

This species honors its discoverer, P. Sintenis.

717. Quina

Antirhea sintenisii Urban

Fruiting twig (above), flowering twig (below), natural size.

718. Dágame, degame *Calycophyllum candidissimum* (Vahl) DC.*

Degame, a recent introduction, is a handsome ornamental and produces a useful wood. During the long flowering period, the trees are covered with white. Distinguishing characters are: (1) paired elliptic leaves mostly 2–4 inches long and ¾–1½ inches wide; (2) clusters of many small white flowers only about ⅜ inch long and broad, a few with an enlarged rounded long-stalked white lobe or blade ½–1¼ inches in diameter formed from calyx; and (3) small cylindric slightly flattened blackish hairy capsules ¼–⅜ inch long.

An evergreen small planted tree 30 feet high and 5 inches in trunk diameter, attaining large size in age and in the forest. The bark is gray or reddish brown, smoothish, becoming fissured and scaly with thin plates. The twigs are brown and hairless or nearly so, ringed at nodes.

The opposite leaves have slender petioles ¼–¾ inch long and at base a pair of scales (stipules) to ⅜ inch long. Leaf blades are long- or short-pointed at both ends, not toothed on edges, thin, becoming hairless or nearly so, shiny green on upper surface and paler beneath.

The flowers are in large branched, flattened clusters (corymbs) at ends of twigs, mostly stalkless in 3's from narrow pointed buds. The hairy cylindric base bears a minute calyx and white corolla with short tube and 4 spreading lobes; 4 short stamens attached on the hairy end of tube and alternate with lobes; and pistil with inferior 2-celled ovary, slender style, and 2-forked stigma. A few flowers in a large cluster produce from the calyx an enlarged rounded or broadly ovate long-stalked thin white lobe or blade, which makes the display of color. The 2-celled capsules contain many minute winged brown seeds. Flowering in winter, the whitish lobes long persistent into spring.

The heartwood is gray brown and the sapwood pale yellow. The wood is hard, heavy (specific gravity 0.65–0.70), with growth rings, fine-textured, strong, and takes a good polish. Principal uses elsewhere include construction, carpentry, cabinetwork, agricultural implements, turned articles, and tool handles. Special uses are archery bows, fishing rods, and fine-toothed combs.

Uncommon as an ornamental in Puerto Rico. Grown also in Hawaii. Where native, classed as an important honey plant. The trees merit wider cultivation for the long-persistent showy white flowers and useful wood.

RANGE.—Southern Mexico to Colombia and Venezuela, also Cuba. Occasionally introduced beyond as an ornamental.

OTHER COMMON NAMES.—dágame (Cuba); camarón (Mexico); salamo, madroño (Central America); guayabillo, palo de peine, calan (Guatemala); calan, colorado, solano, urraco (Honduras); salamo (El Salvador); surrá, conejo (Costa Rica); alazano, guayabo alazano, harino (Panama); alazano, guayabo, guayabo colorado, guayabo joveroso (Colombia); araguato, betún, guatagire, guayabo (Venezuela); degame, lemonwood, lancewood (English).

718. Dágame, degame

Calycophyllum candidissimum (Vahl) DC.*

Flowering twig, natural size.

719. ***Chione seminervis*** **Urban & Ekman**

This shrub or small tree to 20 feet high and 4 inches in trunk diameter was found in 1962 near the summit of Cerro de Punta by Alain Liogier. Distinguishing characteristics are: (1) slender ringed twigs minutely hairy when young, with resin deposits and ending in resinous bud 1/16 inch long; (2) opposite obovate to elliptic leaves 3/4–1 1/4 inches long and 3/8–5/8 inch wide, sometimes larger, blunt or rounded at apex, short-pointed at base, leathery and turned under at edges, hairless, shiny dark green above, paler beneath, with petiole of 1/8 inch; and (3) flower clusters terminal with 3 nearly stalkless flowers 3/8 inch long, composed of 5-toothed calyx, white funnel-shaped corolla with 5 rounded lobes, 5 stamens within tube, and pistil with inferior ovary and style. Rare in upper Cordillera forest on Cerro de Punta at 4,000 feet altitude, Toro Negro Forest.

RANGE.—Hispaniola and Puerto Rico.

720. Martín Avila ***Chione venosa*** **(Sw.) Urban**

This rare small tree is characterized by: (1) opposite narrowly elliptic leathery leaves, short-pointed at both ends and turned under at edges, with few side veins; (2) erect terminal flower cluster with whitish axis and branches bearing several to many fragrant tubular whitish flowers about 1/2 inch long, with 5 rounded corolla lobes; and (3) shiny purplish black oblong fleshy fruits 1/2–3/4 inch long.

Evergreen tree 20–60 feet in height, with smooth dark trunk 6–14 inches in diameter and with dense crown of foliage, hairless throughout. Twigs are gray, green when young, ringed at nodes.

The yellow-green slightly flattened leafstalks are 1/4–3/4 inch long. Blades are 2 1/2–4 1/2 inches long and 3/4–1 1/2 inches wide, above dark green and slightly shiny and beneath dull light green.

The erect whitish flower cluster (cyme) is 2–3 inches broad and 4–5 inches long including stalk, slightly flattened at top. The whitish basal tube (hypanthium) enclosing the inferior 2-celled ovary is 3/16 inch long, bearing 5 minute calyx lobes at apex; the white corolla tube 3/16 inch long and 1/8 inch in diameter, faintly pink tinged in bud, has 5 rounded spreading lobes nearly 1/8 inch long; 5 white stamens more than 3/8 inch long, with narrow orange anthers, are attached near base of corolla tube; and the pistil has a white style 3/8 inch long. The minute calyx lobes remain at apex of the fruit (drupe), which has slightly bitter flesh and a grooved stone containing 2 narrow seeds. With flowers and fruits in spring and summer.

Rare in moist limestone and lower Luquillo forests from sea level to 1,500 feet altitude in northern limestone and eastern foothills of Puerto Rico. Also recorded long ago from St. Croix, St. Thomas, and Tortola.

PUBLIC FORESTS.—Luquillo, Río Abajo.

RANGE.—Hispaniola, Puerto Rico and Virgin Islands, and through Lesser Antilles from St. Kitts and Montserrat to Grenada and Tobago. Also in Guyana.

OTHER COMMON NAMES.—Santa Olalla, palo blanco (Puerto Rico); fat-pork (Montserrat); violette (Grenada).

720. Martín Avila

Chione venosa (Sw.) Urban

Flowering twig and fruits (lower left), natural size.

721. Café excelsa, Dewevre coffee ***Coffea dewevrei* Wildem. & T. Dur.***

Café excelsa or Dewevre or Liberian coffee is uncommonly planted in mountains of Puerto Rico. It is distinguished from the common café or coffee, No. 240, *Coffea arabica* L.,* by: (1) larger size, a small tree 20–30 feet high unless pruned back, with a definite trunk 4–6 inches in diameter; (2) larger opposite elliptic leaves 6–14 inches long and 3–6 inches wide, slightly thick and leathery; (3) white fragrant flowers clustered at leaf bases and nodes back of leaves, the corolla with 5–7 (instead of 5 only) widespreading lobes 1¼ inches across; and (4) slightly larger elliptic dark red or reddish yellow berries ⅝–¾ inch long and ½–⅝ inch broad.

An evergreen small cultivated tree, hairless throughout. The bark is gray and much fissured, the inner bark whitish and bitter. Twigs are stout, shiny, with enlarged ringed nodes and much raised large half-round leaf scars.

The paired leaves have 2 broad short-pointed stipules 3/16 inch long, persistent at the base of the stout petioles ½–¾ inch long. The large thick, leathery blades are blunt at apex, short-pointed at base, and not toothed on edges, with relatively few curved side veins, the upper surface shiny green to dark green, and the lower surface pale yellow green.

The flowers almost stalkless at nodes have a calyx of hairy teeth on the base (hypanthium) less than ⅛ inch long and broad; the white corolla has a narrow cylindric tube ⅜ inch long and 5–7 widespreading lobes ½ inch long, narrow and blunt-pointed; 5–7 stamens inserted in mouth of corolla tube; and pistil with 2-celled inferior ovary and long threadlike 2-forked style. The elliptic fleshy fruits on stalks ⅛ inch long have thin pulp and usually 2 large elliptic seeds or beans, flattened on the side where they join. Flowering and fruiting throughout the year.

The wood is whitish and hard.

The seeds of the species of coffee (genus *Coffea*) contain caffein and when roasted and ground produce the well known beverage. The tree coffee is sometimes planted in the mountains of Puerto Rico but is nowhere common. It belongs to the Liberian group and is regarded also as a variety of Liberian coffee (*Coffea liberica* Hiern.*) in a broad sense. This species is attacked by the coffee leafminer (*Leucoptera coffeella*), the worst insect pest of coffee in Puerto Rico.

PUBLIC FORESTS.—Guilarte, Toro Negro.

RANGE.—Native of West Africa but widely planted and escaping through the tropics.

OTHER COMMON NAMES.—café excelsa, café libérico (Spanish); Dewevre coffee, Liberian coffee (English).

721. Café excelsa, Dewevre coffee *Coffea dewevrei* Wildem. & T. Dur.*

One-half natural size.

722. Jayajabico, black torch ***Erithalis fruticosa* L.**

This shrub common near beaches and in openings of lowland forests sometimes becomes a small tree. It is recognized by: (1) compact rounded masses of dark green foliage, the paired leaves broadly elliptic or nearly round, mostly 2–3½ inches long and 1–2 inches wide, slightly leathery, the stipules forming a narrow ring around twig and leaving a ring scar; (2) terminal clusters of small tubular white fragrant flowers ⅜ inch long and broad, with 5–7 corolla lobes; and (3) black rounded fleshy fruits 3/16 inch in diameter.

Evergreen compact shrub commonly less than 5 feet high, sometimes a large shrub or small tree to 30 feet high and 4 inches in trunk diameter, hairless throughout. Bark dark gray, smoothish, often warty, the inner bark light yellow, bitter. Twigs light green, with rings at nodes, becoming gray. Stipules forming slightly pointed bud 1/16 inch long, afterwards a narrow ring 1/16 inch high at each node.

Leaves opposite, with light green leafstalk ¼–1 inch long. In exposed areas, the leaves are reduced to only 1 inch long and ½ inch wide. Blades blunt or rounded at apex, gradually narrowed to base, not toothed on edges, with few inconspicuous veins, the upper surface dark green and slightly shiny, the lower surface dull green.

Flower clusters (panicles) are terminal and lateral, erect, 2–3 inches long on a long stalk, with several to many short-stalked flowers. Each flower consists of tubular light green calyx 5–7-toothed; white corolla with short tube and 5–7 narrow spreading lobes; white stamens as many as corolla lobes, alternate and inserted near base; and pistil with inferior rounded light green ovary 5–10-celled with 1 ovule in each cell, slender white style, and lobed stigma. Fruits (drupes) light green, becoming black, have calyx persistent in ring at apex, as many longitudinal grooves as cells, and contain 5–10 narrow nutlets. Flowering and fruiting through the year.

The light brown wood has dark streaks in heartwood. It is very hard, heavy, and fine-textured. It could be used for articles of turnery but is available only in small sizes. Elsewhere the durable wood has served for piles and posts. The resinous wood when split has been bound into torches.

Common near beaches and in openings of dry limestone, moist limestone, moist coastal, and lower Cordillera forests from sea level to 400 feet altitude. Also in moist coasts round Puerto Rico and nearly all adjacent islands. Also Mona, Desecheo, Muertos, Icacos, Culebra, Vieques, St. Croix, Buck Island, St. Thomas, St. John, Tortola, Virgin Gorda, and Anegada.

PUBLIC FORESTS AND PARKS.—Cambalache, Guánica, Maricao, San Juan, Susúa; Buck Island Reef, Virgin Islands, Gorda Peak.

RANGE.—Southern Florida and through West Indies from Bahamas to Grenada, Barbados, and Trinidad. From Isla de Margarita and other islands of northern Venezuela west to Bonaire, Curacao, and Aruba. Also in Quintana Roo, Mexico.

OTHER COMMON NAMES.—tea (Puerto Rico); cuaba prieta, víbona, jayajabico, rompe machete (Cuba); black torch, pigeon-berry (Bahamas); parrot-apple (Tobago); bois chandelle, bois chandelle noir (Guadeloupe, Martinique); flambeau, lumbra blancu (Dutch Antilles); black torch, bois chandelle, bois flambeau (Dominica).

This is a variable species with races differing in leaves, flowers, and fruits.

722. Jayajabico, black torch

Erithalis fruticosa L.

Natural size.

723. Plateado ***Exostema ellipticum*** **Griseb.**

This small tree is rare in central and western mountains of Puerto Rico. Distinguished by: (1) opposite elliptic leaves 1½–3½ inches long and ¾–1¼ inches wide, with 2 blunt-pointed stipules ⅛ inch long; (2) large flowers 2½ inch long, the corolla with narrow tube and 5 very narrow lobes, changing color from white and pink to dark red; and (3) cylindric brown seed capsules ½–1¼ inches long.

An evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter. The bark is gray, smoothish, becoming fissured and rough, the inner bark pink and bitter. The hairless twigs are green when young, becoming light brown, ringed at nodes.

The opposite leaves have at base 2 blunt-pointed stipules ⅛ inch long, green, turning brown, and short petioles ⅛–¼ inch long. Blades are mostly short-pointed at both ends, not toothed on edges, thick, leathery, and slightly succulent, the upper suface slightly shiny dark green and hairless, and the lower surface green, sometimes with tufts of minute hairs in angles of side veins with midvein.

Flower clusters (panicles like corymbs) are terminal, slightly flattened, to 5 inches broad. The flowers borne on widely forking slender stalks ¼–¾ inch long, the flower buds 1¾–2¾ inches long and less than ⅛ inch wide, cream colored. The narrow tubular base (hypanthium) ¼ inch long bears the short calyx with 5 teeth 1/16 inch long; the corolla has a narrow cylindric tube 1–1½ inches long and less than ⅛ inch wide, and 5 very narrow spreading lobes 1½ inches long and 1/16 inch wide; 5 threadlike stamens united in a tube to base of corolla and extending 1¼ inches beyond; and pistil with 2-celled inferior ovary, very long threadlike style about 2¼ inches long, and enlarged stigma. The cylindric seed capsules have calyx teeth at apex, are hard-walled, and split into 2 parts. Flowering in spring and summer and with fruits from summer to winter.

The wood is light brown and hard. Elsewhere reported to be of good quality and used in rural carpentry.

Rare in lower Cordillera forest at 1,500–3,000 feet altitude in central and western mountains of Puerto Rico.

PUBLIC FORESTS.—Maricao, Toro Negro.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—cayateje, plateado, vigueta, lirio santana, chinchona (Cuba); lirio bobo, piñi-piñi, guina criolla (Dominican Republic).

724. ***Exostema sanctae-luciae*** **(Kentish) Britten**

A rare shrub or small tree to 25 feet high identified by: (1) opposite oblong to elliptic leaves 4–8½ inches long and 2–4 inches wide, long-pointed at apex, slightly thickened, shiny and hairless on upper surface, dull and with tufts of minute hairs in angles of side veins with midvein beneath, with stout petioles less than ½ inch long: (2) flower clusters (panicles like corymbs) terminal and flattened, to 6 inches broad, the many flowers on stalks ¼–½ inch long, composed of tubular base (hypanthium) ¼ inch long, calyx with 5 pointed teeth 1/16 inch long, and pink to dark red corolla with tube 1–1¼ inches long and 5 very narrow lobes of 1 inch; and (3) cylindric seed capsule ⅜–¾ inch long, with faint ridges. Collected in mountain forest near Maricao nearly a century ago. Sterile specimens were collected by Alain Liogier in Luquillo Mountains at 3,300 feet altitude in 1963 and in limestone hills near Bayamón at 300 feet in 1964. RANGE.—Hispaniola, Puerto Rico, and Lesser Antilles in Guadeloupe, Dominica, Martinique, St. Lucia, and St. Vincent. OTHER COMMON NAMES.—piñi-piñi, quina criolla (Dominican Republic); quina (St. Lucia); bois tabac, quinquina caraïbe, quinquina-piton (Martinique); quina (Dominica). BOTANICAL SYNONYM.—*Exostema floribundum* (Sw.) Roem. & Schult. Elsewhere the wood has served for canoe paddles and the bark in home remedies.

723. Plateado

Exostema ellipticum Griseb.

Fruiting twig (above), flowering twig (lower right), natural size.

725. Cucubano liso, velvetseed ***Guettarda elliptica* Sw.**

Characters for recognition of this shrub or small tree are: (1) paired short side twigs with crowded raised half-round leaf scars; (2) small elliptic to ovate leaves ¾–2 inches long and ½–1¼ inches wide, opposite and crowded at ends of short side twigs; (3) few flowers at the end of a stalk ½–1 inch long at leaf base, about ⅜ inch long, the yellowish or whitish corolla with narrow tube and 4 lobes; and (4) round fruit ¼ inch in diameter, turning to red and black.

Evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, reportedly larger. The bark is slaty gray or gray brown, smooth, with minute dots or lines, sometimes mottled and peeling off in thin flakes. Inner bark is gray brown or pinkish and slightly bitter. The gray slender twigs are hairy when young, with whitish dots (lenticels) and rings at nodes.

The opposite leaves have slender hairy leafstalks ⅛–¼ inch long and paired long-pointed hairy stipules ⅛ inch long, which form the bud and shed early. The thin blades silky hairy when young have a rounded apex with minute point, short-pointed or rounded base, edges not toothed, few curved side veins, upper surface dull green and almost hairless, the lower surface light green with fine, pressed silky hairs, especially on veins.

The flowers consist of a cup-shaped hairy calyx ⅛ inch long; yellowish or whitish silky hairy corolla ¼ inch long with narrow tube and 4 lobes; 4 stamens in throat of tube alternate with lobes; and pistil with minute inferior 4-celled ovary, slender style, and dotlike stigma. Fruits (drupes) finely hairy, slightly fleshy, with calyx at apex, large stone, and few seeds. Bearing flowers in spring and fruits in summer.

The wood is light brown, hard, heavy (specific gravity 0.83), and fine-textured.

Uncommon in dry coast and limestone forests at 100–400 feet altitude along south coast of Puerto Rico. Also Mona, Desecheo, Muertos, and St. Thomas.

PUBLIC FOREST.—Guánica.

RANGE.—Southern Florida including Florida Keys, Bahamas, Greater Antilles, and St. Thomas. Also Mexico including Tres Marías and Revillagigedo Islands, British Honduras, Guatemala, Panama, Venezuela, and Guyana.

OTHER COMMON NAMES.—cigüilla, cuero de sabana (Cuba); crucillo, crucecilla, guayabillo prieto (Mexico); cabrito, cruceto negro, punteral (Venezuela); velvetseed (English); Everglades velvetseed (United States); pickle-wood (British Honduras).

725. Cucubano liso, velvetseed *Guettarda elliptica* Sw.

Fruiting twig (left), flowering twig (right), natural size.

726. Cucubano ***Guettarda krugii* Urban**

Shrub or small tree of southwestern Puerto Rico, identified by: (1) paired stout gray twigs with raised half-round to round leaf scars; (2) opposite small mostly elliptic leaves 1–4 inches long and ½–2½ inches wide, with finely wavy edges turned under, thick and stiff, beneath soft hairy with prominent network of fine raised veins; (3) flowers 1 to few on short stalks at leaf base or end of twig, ¾–1¼ inches long, the white densely hairy corolla with narrow tube and 5–8 lobes; and (4) round or pear-shaped densely hairy yellow or reddish fleshy fruits ½–1 inch long.

Evergreen shrub or small tree to 20 feet high and 3 inches in trunk diameter, reportedly to 30 feet tall, with few slender branches ending in clusters of leaves and without a definite crown. Bark gray, smooth, with few thin flakes peeling off and exposing green patches beneath. Inner bark light brown, tasteless. The twigs are densely brown hairy when young, becoming gray and hairless, stout with ringed nodes and both long and short internodes.

Leaves have densely hairy leafstalks ¼–⅝ inch long and paired brown hairy ovate pointed stipules ¼–½ inch long, which form the bud and shed early. Blades are mostly elliptic, also nearly round or obovate, blunt or short-pointed at apex, rounded or slightly notched at base, the upper surface almost hairless with several pairs of nearly straight side veins, the lower surface paler and yellowish green, with raised veins and soft hairy.

The fragrant flowers have a brown hairy tubular calyx ¼ inch long; densely white hairy corolla ¾–1 inch long with narrow tube and 5–8 narrow spreading lobes more than ½ inch across; stamens in throat of corolla tube, as many as lobes and alternate; and pistil with minute inferior 4-celled ovary, long slender style, and dotlike stigma. Fruits (drupes) are greenish when immature, narrowed at base, have calyx at apex, almost tasteless pulp, large stone, and few seeds. Flowering and fruiting from spring to fall.

Wood light brown, hard and brittle.

Uncommon in dry coastal and limestone forests at 100–500 feet altitude in southwestern Puerto Rico from near Ponce to Cabo Rojo.

PUBLIC FOREST.—Guánica.

RANGE.—Puerto Rico and Bahamas.

OTHER COMMON NAMES.—velvetseed, frogwood (Bahamas).

726. Cucubano

Guettarda krugii Urban

Flowering twig (above), fruiting twig (below), natural size.

727. Cucubano ***Guettarda ovalifolia* Urban**

This small tree is recognized by: (1) its paired crowded elliptic leaves with finely wavy edges and deeply sunken curved side veins; (2) flowers ¾ inch long, several crowded at end of slender stalk 2–5 inches long, white, pink, or light purple, tubular with 5–6 lobes; and (3) rounded finely hairy fruits ¼ inch in diameter.

Evergreen small tree 30 feet high and 4 inches in trunk diameter. The bark is gray and smooth, slightly warty or becoming slightly fissured, the inner bark light pink and slightly astringent. The twigs are brownish, hairy when young, with rings at nodes.

The opposite leaves crowded near apex of twig have hairy leafstalks ¼–¾ inch long and paired very narrow pointed hairy stipules ⅛ inch long. The blades vary in size, 1½–5 inches long and ¾–2½ inches wide, rounded with minute point at apex and short-pointed or rounded at base, thin or slightly thickened, the upper surface dull green and hairless, and the lower surface dull light green and finely hairy on the raised light yellow veins.

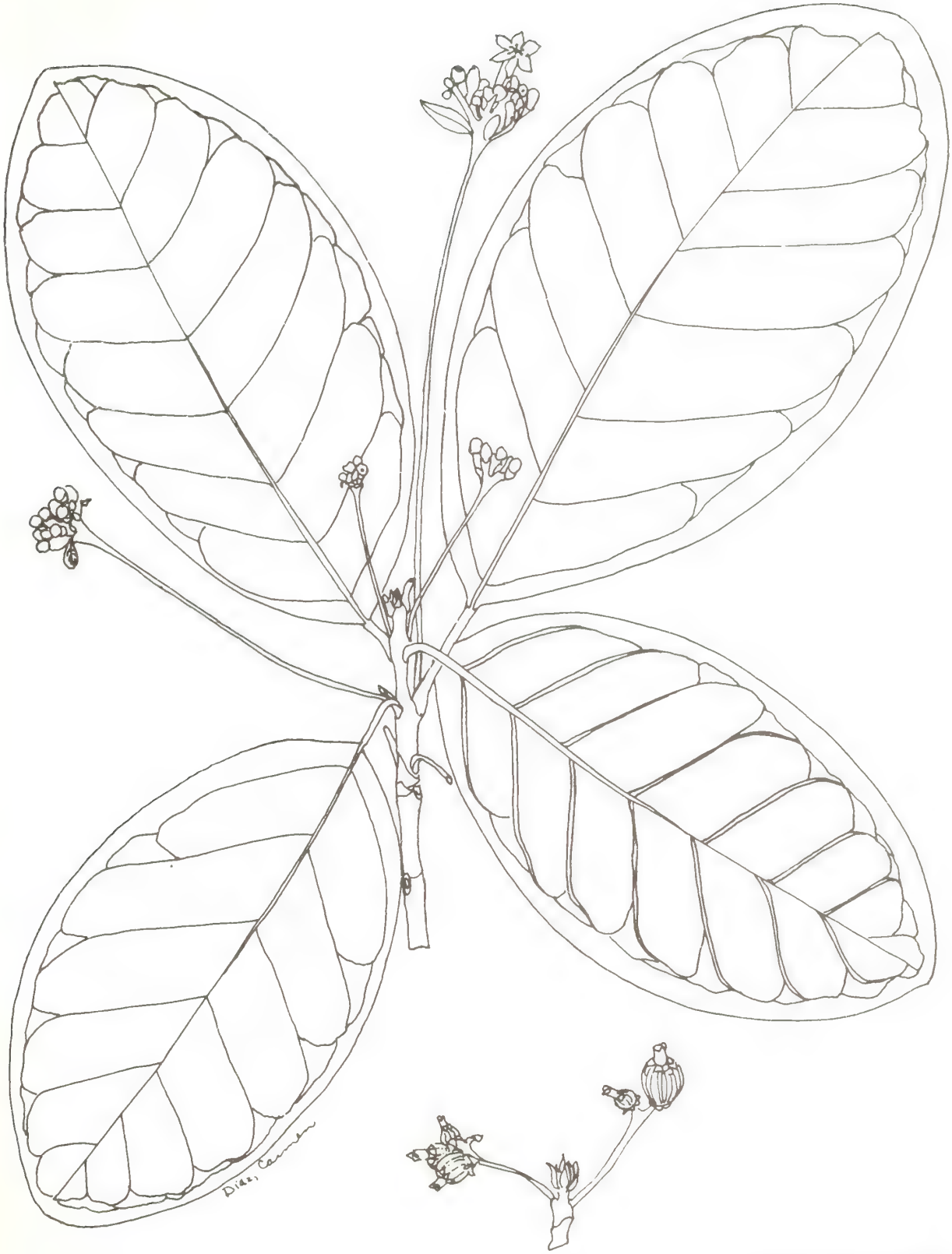
The flowers consist of cuplike hairy calyx ⅛ inch long; white or light purple finely hairy corolla with narrow tube about ⅝ inch long and 5–6 spreading lobes ⅜ inch across; 5–6 stamens in throat of tube and alternate with lobes; and pistil with minute 4–6-celled inferior ovary, slender style, and dotlike stigma. The fruits (drupes) finely hairy, slightly fleshy, with large stone and few seeds. Flowering from spring to fall and with fruits in summer and fall.

Wood light brown and hard.

Uncommon in moist limestone and lower Cordillera forests at 300–2,800 feet altitude in western mountains of Puerto Rico.

PUBLIC FORESTS.—Guajataca, Maricao, Río Abajo, Susúa.

RANGE.—Puerto Rico and Hispaniola.



727. Cucubano

Guettarda ovalifolia Urban

Flowering twig (above), fruits (below), natural size.

728. Cucubano de Vieques, blackberry ***Guettarda parviflora*** **Vahl**

Distinguishing characters of this shrub or small tree are: (1) paired slender twigs with ringed nodes formed by scalelike pointed stipules; (2) leaves opposite and crowded, oblong to elliptic or obovate, ¾–2¼ inches long and ⅜–1 inch wide, upper surface shiny yellow green; (3) flowers 1–3 on short stalk at leaf base, nearly ⅜ inch long, the pinkish corolla with narrow tube and 4–6 unequal lobes; and (4) round black fruit ¼ inch in diameter.

Evergreen shrub or small tree to 25 feet in height, with 1 to several trunks to 5 inches in diameter. The bark is gray and smooth to scaly, the inner bark light brown and tasteless. Twigs are slender, gray or brown, finely hairy when young, with whitish dots (lenticels).

The leaves have hairy brown petioles about ⅛ inch long and paired scalelike brown stipules less than 1/16 inch long, pointed and hairy, which form the bud and shed early. Blades are short-pointed or blunt at apex, rounded at base, not toothed on edges, thin, upper surface shiny yellow green and hairless, lower surface dull light green and slightly hairy.

Flowers are composed of tubular hairy calyx 1/16 inch long on short 4–5-celled inferior ovary; pinkish hairy corolla ¼ inch long with narrow tube and 4–6 unequal spreading lobes more than ⅛ inch across; stamens in throat of corolla tube, as many as lobes and alternate; and pistil with as many ovules as cells in ovary, slender style and dotlike stigma. Fruits (drupes) finely hairy, slightly fleshy, with large stone and few seeds. Noted with flowers in spring and with fruits nearly through the year.

The wood is light brown and hard.

Scattered and uncommon in moist coastal forest from sea level to 700 feet altitude in eastern and southeastern Puerto Rico. Also islands eastward including Palominos, Vieques, St. Croix and Buck Island, St. Thomas, St. John, Jost Van Dyke, Tortola, and Virgin Gorda.

PUBLIC PARKS.—Buck Island Reef, Virgin Islands.

RANGE.—Puerto Rico and Virgin Islands, through Lesser Antilles from St. Martin and St. Barts to Grenada, Trinidad and Tobago, and Venezuela.

OTHER COMMON NAMES.—blackberry (Virgin Islands); punteral, punteral negro, punta real blanca (Venezuela); bois guette (St. Lucia); bois puant, bois de fer blanc (Martinique); wild cherry (Dutch Antilles).

728. Cucubano de Vieques, blackberry *Guettarda parviflora* Vahl

Twig with flower buds (above), fruiting twig (lower left), natural size.

729. Roseta ***Guettarda pungens*** **Urban**

The paired small stiff elliptic leaves ending in a sharp slender yellowish spine 1/8 inch long distinguish this shrub, sometimes a small tree, of mountains in western Puerto Rico. Other characters for identification are: (1) white flowers 5/8–3/4 inch long, single at leaf bases, the white to pinkish corolla with narrow tube and 5–6 spreading lobes; and (2) round finely hairy fruit 1/4 inch in diameter, blackish or violet.

Evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, often with several branches from base. The bark is gray and smooth or becoming scaly, the inner bark slightly bitter. Twigs are paired, gray, finely hairy when young, with ringed nodes.

The opposite, often crowded leaves have short finely-hairy leafstalks 1/8 inch long and paired very narrow pointed stipules about 1/8 inch long. Blades are 3/4–1 1/4 inches long and 3/8–7/8 inch wide, short-pointed at base, stiff and leathery, becoming hairless, the upper surface green, and the lower surface paler.

The flowers are single and almost stalkless at base of leaves. The calyx is less than 1/8 inch long and slightly 2-lobed; the corolla is white to pinkish, finely hairy, with narrow tube more than 1/2 inch long and 5–6 narrow lobes 3/8–1/2 inch across; 5–6 stamens in throat of tube and alternate with lobes; and pistil with minute inferior 4–5-celled ovary, slender style, and dot-like stigma. Fruits (drupes) finely hairy, slightly fleshy, with large stone and few seeds. Flowering from spring to fall, with fruits in fall.

The wood is light brown and hard.

Locally common in lower Cordillera forest at 1,000–2,700 feet altitude including serpentine slopes, in western mountains of Puerto Rico.

PUBLIC FORESTS.—Maricao, Río Abajo, Susúa.

RANGE.—Puerto Rico and Hispaniola.

OTHER COMMON NAMES.—encinillo, palo de cruz, yaya (Dominican Republic).

729. Roseta

Guettarda pungens Urban

Natural size.

730. Cucubano de monte ***Guettarda valenzuelana* A. Rich.**

This small to medium-sized tree of eastern mountains of Puerto Rico is identified by: (1) opposite ovate to elliptic or obovate leaves 1½–5 inches long and ⅞–2¾ inches wide, slightly thickened, with stout leafstalks ⅜–¾ inch long, opposite and crowded at ends of twigs; (2) few flowers clustered at end of slender stalk 1½–4½ inches long at leaf base, ¾–1 inch long, the whitish and pinkish hairy corolla with narrow tube and 5–7 lobes; and (3) and round fruit ¼–5/16 inch in diameter.

Evergreen small to medium-sized tree to 65 feet high and 1 foot in trunk diameter. Bark gray, smooth to slightly fissured. The twigs are brownish gray, hairy when young, with rings at nodes, with both long and short internodes, and with raised half-round leaf scars.

The leaves have paired hairy pointed green stipules ¼ inch long, which form the bud and shed early. Blades are rounded at apex, rounded or short-pointed at base, curved under at edges, becoming hairless except for minute hairs on veins beneath, the upper surface dull dark green with several pairs of nearly straight slightly sunken side veins, and the lower surface light green.

The fragrant flowers have cuplike minutely hairy calyx ⅛ inch long, whitish and pinkish hairy corolla nearly ¾ inch long with 5–7 spreading lobes ½ inch across; 5–7 stamens in throat of tube and alternate with lobes; and pistil with minute 2–3-celled ovary, long slender style, and rounded stigma. Fruits (drupes) are light green, finely hairy, with brown ring of calyx at apex. Flowering and fruiting from spring to fall.

The sapwood is cream to very light brown, and the heartwood golden brown, often with darker streaks. The attractive wood has good luster, fine texture, and generally straight grain. It is moderately hard, strong, heavy (specific gravity 0.65), and takes a good polish.

Tests of the wood have been made in Puerto Rico. Cucubano wood seasons at a moderate rate with a moderate amount of degrade. It rated excellent in turning, good in planing, shaping, and mortising, fair in boring and sanding, and poor in screw splitting. It is very susceptible to attack by dry-wood termites and probably is not durable in the ground.

Cucubano wood is seldom used in Puerto Rico except for fence posts and is available generally in small logs. It probably is suitable for tool handles, fancy boxes, brush backs, turnery parts, furniture, cabinetwork, farm implements, interior trim, paneling, novelty items, construction, and bridges. Elsewhere it is used in rural construction.

Common locally in lower Luquillo forest at 1,500–2,000 feet altitude in eastern mountains of Puerto Rico.

PUBLIC FOREST.—Luquillo.

RANGE.—Cuba, Hispaniola, and Puerto Rico.

OTHER COMMON NAMES.—hueso, vigueta, icaquillo, naranjito (Cuba).

BOTANICAL SYNONYMS.—*Guettarda laevis* Urban.

Under the name *Guettarda laevis* given in 1899, this species was considered to be confined to Puerto Rico. However, the local species has been united recently with the older one from Cuba and Hispaniola. The name honors José Maria Valenzuela, who collected plants in Cuba in 1833.

730. Cucubano de monte

Guettarda valenzuelana A. Rich.

Flowering twig (upper left) and fruiting twig, natural size.

731. Bálsamo, scarletbush ***Hamelia patens*** **Jacq.**

Bálsamo is a handsome shrub of open areas sometimes attaining the size of a small tree. It is easily recognized by: (1) reddish or pinkish tinge on various parts, including twigs, petioles, midvein, branches of flower clusters, flowers, and fruits; (2) elliptic leaves mostly in 3's, with long curved side veins; (3) narrow tubular orange-red to scarlet flowers ¾–⅞ inch long, erect and nearly stalkless on top side of widely forking branches, with successively smaller flower buds toward end; and (4) fruit an elliptic juicy berry, dark red to purple or blackish.

Commonly a shrub 6–10 feet high, often flowering when smaller, sometimes becoming a small tree 15 feet high and 3 inches in trunk diameter, evergreen. Bark gray, smooth, the inner bark light green and almost tasteless. Twigs purplish tinged, angled, minutely hairy, ending in bud of narrow pointed stipules ⅛ inch long, and becoming ringed from scars of leaves and stipules.

Leaves mostly 3 at a node, sometimes 2 or 4 (whorled), joined at base by stipules. Petioles ½–2 inches long, slender, slightly grooved above, dark red, minutely hairy. Leaf blades elliptic, 2–6 inches long and 1–3 inches wide, mostly short-pointed at both ends, not toothed on edges, thin. The upper surface is slightly hairy or nearly hairless, dull green with dark red midvein and the side veins long curved and slightly sunken, and the lower surface finely hairy (densely hairy in dry areas), dull light green with prominent pink midvein and raised pinkish side veins.

Flower clusters (cymes) terminal, 2–4 inches long and broad, flattened, composed of widely-forking reddish finely-hairy branches, with fruits and oldest flowers at center and youngest buds toward sides. Flower buds narrowly tubular, orange red. The minute 5-toothed calyx above inferior ovary is persistent on fruit. The cylindric corolla almost ¾ inch long and ⅛ inch wide changes color from orange red to scarlet, is finely hairy, slightly fleshy and stiff, 5-angled and ending in 5 lobes 1/16 inch long, and sheds soon after opening. Stamens 5, ⅜ inch long, very narrow, within and inserted on corolla tube. The pistil consists of inferior rounded red ovary ⅛ inch long, 5-celled, with several ovules in each cell, and threadlike reddish style ⅝ inch long. The elliptic berries ¼–⅜ inch long are erect, nearly stalkless, juicy, 5-celled, and bear ring of calyx at apex. There are many minute brown seeds. Flowering and fruiting throughout the year.

The wood is light brown and hard.

Elsewhere the plants are grown as ornamentals for the showy flowers, often borne when less than 2 feet high. The fruits and leaves have served for home remedies in some countries. It is reported that the sour fruits are edible as well as medicinal. The stems and leaves have been used in tanning leather. Propagated by seeds and cuttings.

Bálsamo is uncommon in open areas and thickets in the moist limestone and lower foothills of Cordillera from sea level to 2,000 feet altitude throughout moist areas of Puerto Rico. Also in St. Croix and reported long ago from St. Thomas and St. John.

PUBLIC FORESTS.—Cambalache, Guajataca, Río Abajo, Susúa.

RANGE.—Common and widespread through tropical America, including southern Florida, Bermuda, Bahamas, Greater Antilles, Virgin Islands, Lesser Antilles from St. Kitts to Guadeloupe, Dominica, Martinique, St. Vincent, and Trinidad and Tobago. Also from Mexico south through Central America and South America to Brazil, Paraguay, and Argentina.

OTHER COMMON NAMES.—bálsamo colorado, pata de pájaro (Puerto Rico) coralillo (Spanish); buzunuvo, desyerba conuco, buzunuco (Dominican Republic); ponasí, coralillo, palo coral (Cuba); chacloco, kanan (Mexico); chichipín (Guatemala, Honduras); canudo, clavito, flor de cangrejo, hierba de erisipela, hierba de cáncer, ixcanan amarillo (Guatemala); chichipince, zambumbia, sancocho, doncella, flor de baño (El Salvador); achiotillo colorado, coral, coloradillo (Honduras); estirnina, canilla de venado (Nicaragua); añileto, azulillo, palo camarón, zorillo, zorillo real (Costa Rica); uvero, red berry (Panama); bencenuco, leoncito, cresta de gallo, recadito (Colombia); coralito (Venezuela); scarletbush, scarlet hamelia, firebush (United States); corail (Haiti).

BOTANICAL SYNONYM.—*Hamelia erecta* Jacq.

The Spanish common name coralillo refers to the resemblance of the cluster of flowers to a coral necklace. Britton and Wilson (*10*) reported a yellow-flowered race from near Aibonito.

731. Bálsamo, scarletbush *Hamelia patens* Jacq.

Flowering twig (above), fruits (lower left), natural size.

732. Bola de nieve, white ixora ***Ixora thwaitesii* Hook. f.***

Bola de nieve (snowball) is a shrub or sometimes small tree planted in gardens for its large clusters of white flowers. Distinguishing characters include: (1) opposite large narrowly elliptic to oblong leathery leaves; and (2) showy white flowers 1¼–1½ inches long with very narrow tube and 4 (or 5) spreading lobes more than ½ inch across, in many-flowered compact terminal clusters 2–4 inches across, suggesting a snowball.

A tall evergreen shrub or small tree to 20 feet high and 4 inches in trunk diameter, hairless. Bark gray, smoothish, with corky warts (lenticels), becoming divided into small scales. The inner bark is whitish with orange streaks, slightly bitter. Twigs finely hairy and green when young, becoming gray, ringed at nodes.

Leaves opposite, with petioles ⅛–½ inch long. Stipules paired, ⅛ inch long, pointed and sheathing twig at node. Blades are 2–7 inches long and ¾–2 inches wide, blunt to long-pointed at apex, short- to long-pointed at base, not toothed on edges, the upper surface slightly shiny or dull green with few side veins, and the lower surface dull light green.

Flower clusters (corymbs) bear many fragrant white flowers nearly stalkless and crowded at ends of branches. Flowers are composed of red-brown base (hypanthium) bearing 4–5 light green calyx lobes nearly 3/16 inch long; corolla with very narrow greenish-white tube 1¼–1½ inches long and less than 1/16 inch in diameter and 4 (or 5) widely spreading lobes more than ½ inch across; 4 (or 5) short stamens in throat of corolla and bending down between the lobes; and pistil with inferior 2-celled ovary with 1 ovule in each cell, very long slender style, and 2-forked stigma. Fruits (berries) not observed, described as rounded and ½ inch in diameter, containing 2 nutlets. Flowering throughout the year.

The wood is light brown and hard.

Uncommon in cultivation for ornament in residential areas and gardens of Puerto Rico and St. Thomas. Probably also in other islands nearby.

RANGE.—Native of Ceylon but long cultivated in through the tropics including Greater and Lesser Antilles.

OTHER COMMON NAMES.—nevado (Puerto Rico); bola de nieve, bouquet de novia (Spanish); corona de reina (El Salvador, Nicaragua); Thwaites ixora (United States); riceflower (St. Barts); buque de noiva (Brazil).

Cultivated plants apparently of the same species are known elsewhere also as *Ixora finlaysoniana* Wall. That species is native of Thailand, China, and perhaps elsewhere in southeast Asia. Further check of the names is desired.

732. Bola de nieve, white ixora

Ixora thwaitesii Hook. f.*

Flowering twig, natural size.

733. Alfilerillo ***Machaonia portoricensis* Baill.**

Alfilerillo is a much-branched spiny shrub or sometimes small tree known only from southwestern Puerto Rico. Its distinguishing characters are: (1) 2 or 3 slender spreading spines ¼–1 inch long at most nodes; (2) small elliptic or nearly round leaves ¼–⅝ inch long and 3/16–⅜ inch wide, 2 or 3 almost stalkless at a node; (3) many small hairy flowers ⅛ inch long and broad with tubular 4-lobed white corolla, crowded in small terminal clusters; and (4) top-shaped brown seed capsules 3/16 inch long.

A deciduous, large, much-branched shrub with several stems from base, sometimes a small tree to 20 feet high and 3 inches in trunk diameter. The bark is gray, smooth, becoming fissured, with a few spines remaining, the inner bark whitish or light green and slightly bitter. Twigs brown, long and slender, finely hairy, bearing at the ringed nodes 2 or 3 spines each above a leaf and representing a branch and sometimes bearing minute leaves.

Leaves opposite or whorled, with minute pointed hairy stipules and very short hairy petioles about 1/32 inch long, blunt or rounded at apex, short-pointed or blunt at base, not toothed on edges, thin, with side veins inconspicuous, the upper surface green and hairless, and the lower surface light green with midvein often slightly hairy.

Flower clusters (panicles) are terminal, ¾–2 inches long and broad, erect and short-stalked at ends of slender twigs. The crowded, almost stalkless flowers are composed of cylindric hairy base (hypanthium) 1/16 inch long, which encloses the inferior ovary and bears the 4 shorter hairy calyx lobes and other parts; the white corolla has a short tube 1/16–⅛ inch long and 4 spreading rounded lobes 1/16 inch long; 4 short stamens on throat of corolla; and pistil with inferior 2-celled ovary and slender style. The seed capsules are top-shaped (obovoid), flattened, brown, and hairy, bear the calyx lobes at apex, split into 2 parts from base upward, and contain 2 brown seeds ⅛ inch long. Flowering and fruiting irregularly through the year.

The wood is light brown and hard.

Common locally, often forming thickets, in dry limestone and lower Cordillera forests at 200–1,500 feet altitude in southwestern foothills of Puerto Rico from Ponce westward.

PUBLIC FORESTS.—Guánica, Maricao, Susúa.

RANGE.—Known only from southwestern Puerto Rico.

OTHER COMMON NAME.—roseta (Puerto Rico).

733. Alfilerillo

Machaonia portoricensis Baill.

Flowering twig (above), fruiting twig (lower right), natural size.

734. ***Palicourea alpina*** **(Sw.) DC.**

This shrub or small tree of dwarf forests of summits of mountains in Puerto Rico is identified by: (1) opposite elliptic leaves 1½–4 inches long and ⅝–1½ inches wide, slightly thickened and leathery, with narrow pointed 2-lobed stipules ⅛–¼ inch long persistent at a node; (2) flowers about ¾ inch long, with tubular 5-lobed corolla pale yellow, turning to pale purple, many on slender red to orange-red or pink branches in terminal clusters; and (3) black berries nearly ⅜ inch long, egg-shaped and slightly flattened.

An evergreen shrub 12 feet high or small tree to 20 feet high and 5 inches in trunk diameter. The bark is gray and smoothish or slightly fissured, the inner bark whitish and almost tasteless. The twigs are green, hairless with persistent stipules at the enlarged ringed, 2-angled nodes.

The opposite leaves have petioles ¼–½ inch long. Blades are long-pointed at apex, long- or short-pointed at base, not toothed on edges, the upper surface green to dark green with curved sunken side veins, slightly shiny, hairless, and the lower surface light green and often hairy on the midvein and raised side veins.

Flower clusters (panicles) 2–4 inches long have a dark red axis and red to orange-red or pink branches. Flowers many, opening few at a time and spreading horizontally, composed of pale yellow base (hypanthium) ⅛ inch long bearing 5-toothed calyx; corolla with cylindric tube ⅝ inch long and 5 spreading lobes ⅜ inch across, slightly succulent and swollen at base, changing color from pale yellow to purple; stamens 5, inserted within corolla tube; and pistil with inferior ovary and long style. The fruits are green with lighter ridges when immature, turning black, slightly angled when dry, with calyx persistent at apex, 2-celled with 2 nutlets. Flowering and fruiting throughout the year.

The wood is light brown and hard.

Common locally in dwarf forest at 3,000–4,390 feet altitude on high peaks and ridges of the central mountains of Puerto Rico. To the summit of Cerro de Punta, the island's highest peak.

PUBLIC FORESTS.—Guilarte, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, Guadeloupe, and Dominica.

OTHER COMMON NAMES.—tafetán, cafetán, cenizoso cimarrón (Dominican Republic); tapa camino (Cuba); bois cabrit montagne (Guadeloupe).

734. *Palicourea alpina* (Sw.) DC.

Flowering twig (above), fruiting twig (lower left), natural size.

735. Bálsamo real, showy palicourea ***Palicourea barbinervia*** **DC.**

This rare shrub or small tree is identified by: (1) opposite elliptic large leaves 4–10 inches long and 2–5 inches wide, short-petioled, with persistent 2-lobed stipules; (2) flowers about $\frac{3}{8}$ inch long, with white tubular 5-lobed corolla, finely hairy, many on slender yellow or reddish branches in large long-stalked erect clusters; and (3) egg-shaped berry $\frac{3}{16}$ inch long.

An evergreen shrub or small tree to 20 feet high and 3 inches in trunk diameter. Bark brown gray, smooth to slightly fissured. The inner bark is light yellow with a green outer layer, bitter. Twigs stout, slightly flattened when young, green, ringed at nodes, hairless, ending in rounded flat green bud of $\frac{3}{16}$ inch formed by stipules.

Leaves opposite, with paired 2-lobed membranous stipules to $\frac{5}{16}$ inch long and short petioles $\frac{3}{8}$–$\frac{3}{4}$ inch long. Blades are long-pointed at both ends, not toothed on edges, slightly thickened, slightly shiny, the upper surface green and hairless with many curved much sunken side veins, and the lower surface light green with very raised veins and minutely hairy on midvein.

Flower clusters (panicles) 4–6 inches long, terminal on long stalks of 3–4 inches with many yellow or reddish branches. Flowers many, with green base (hypanthium) $\frac{1}{16}$ inch long bearing 5 short rounded hairy-margined calyx lobes; corolla with cylindric tube $\frac{5}{16}$ inch long swollen at base and with 5 short lobes, finely hairy; 5 stamens inserted within corolla tube; and pistil with inferior 2-celled ovary, long slender style, and 2-lobed stigma. Flowering and fruiting throughout the year.

The wood is light brown and hard.

Rare on moist limestone, moist coastal, and lower Cordillera forests at 300–2,000 feet altitude. Scattered throughout moist areas of Puerto Rico.

PUBLIC FORESTS.—Carite, Maricao, Río Abajo.

RANGE.—Puerto Rico, Hispaniola, Jamaica, and Cuba. Also Trinidad.

OTHER COMMON NAMES.—tafetán (Puerto Rico); flor de soldado, bleo cimarrón (Cuba); ahoguey blanco, tafetán (Dominican Republic; showy palicourea (English).

735. Bálsamo real, showy palicourea *Palicourea barbinervia* DC.

Fruiting twig (above), flowers (lower right), natural size.

736. Cachimbo, red palicourea ***Palicourea crocea*** **(Sw.) Roem. & Schult.**

This large shrub sometimes treelike is common in understory of moist forests. Its distinguishing characters are: (1) paired elliptic leaves 2½–8 inches long and 1–2½ inches wide, with paired very slender scales (stipules) forming sheath at base and curved back; (2) many tubular red flowers ⅜ inch long from slender yellow or orange stalks and branches of much-branched terminal clusters longer than wide; and (3) elliptic red to dark brown or black drupes less than ¼ inch long.

An evergreen shrub sometimes treelike and 15 feet high with slender trunk to 2 inches in diameter. The twigs are hairless and rounded or slightly angled, ringed at nodes.

Leaves are opposite, connected at base by paired 2-forked persistent scales (stipules) 3/16 inch long and have slender petioles of ¼–1 inch. The blades are mostly long-pointed at both ends, thin, with many fine curved side veins, hairless except for minute hairs along midvein beneath.

The flower clusters (panicles) erect and longer than wide, with many branches mostly on 1 side. Flowers are short-stalked, composed of short yellow calyx, corolla with cylindric red tube and 5 short lobes, 5 stamens within tube, and pistil with inferior ovary, style, and 2-forked stigma. The drupes contain nutlets with points at apex. Probably flowering and fruiting irregularly through the year.

Common in understory of moist forest including lower and upper Luquillo and Cordillera forests from sea level to 3,300 feet altitude in Puerto Rico.

PUBLIC FORESTS.—Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico, and Lesser Antilles from Guadeloupe to Grenada and Trinidad. Also northern South America in Colombia, Venezuela, and Ecuador.

OTHER COMMON NAMES.—tapa camino, ponasí (Cuba); bois de l'encore, bois cabrit, bois fou-fou (Martinique).

BOTANICAL SYNONYM.—*Palicourea brevithyrsa* Britton & Standl.

736. Cachimbo, red palicourea *Palicourea crocea* (Sw.) Roem. & Schult.

Flowering twig (above), fruits (right), natural size.

737. ***Palicourea domingensis*** **(Jacq.) DC.**

This understory shrub or sometimes small tree of moist forests is identified by: (1) twigs with ringed nodes formed by scars of minute scales (stipules) that shed early; (2) opposite narrowly elliptic leaves 2–8 inches long, and 1–2¼ inches wide, long-pointed at both ends, thin and hairless; (3) flowers in 3's nearly stalkless in terminal branched clusters, about ½ inch long, the white or pinkish corolla with narrow tube and 5 narrow lobes; and (4) fruit (drupe) rounded, shiny black, about ¼ inch long.

Evergreen shrub or small tree to 16 feet high, with trunk to 3 inches in diameter, hairless throughout. Twigs slender, green, ringed and enlarged at nodes.

The opposite leaves have petioles ¼–¾ inch long. Blades are not toothed on edges and have curved side veins, the upper surface dark green, and the lower surface paler.

Flower clusters (panicles) terminal and erect, about 2–3 inches long and broad, with several flowers in groups of 3, opening 1 or 2 at a time. Flowers consist of greenish basal cup (hypanthium), greenish 5-toothed calyx, corolla narrowly tubular with 5 short narrow lobes, 5 stamens within tube, and pistil with 2-celled ovary, slender style, and 2-forked stigma. The juicy fruit contains a stone with 5 points toward apex. Flowering in spring and summer, fruiting in summar and fall.

It has been suggested that this species might become an ornamental for its white flowers and wandlike appearance.

Uncommon in understory of moist forests at low and middle altitudes in Puerto Rico. Also in St. Croix, St. Thomas, St. John, and Tortola.

PUBLIC FOREST AND PARK.—Carite; Sage Mountain.

RANGE.—Cuba, Jamaica, Hispaniola, Puerto Rico and Virgin Islands, and Lesser Antilles from Saba, St. Eustatius, and Antigua to Guadeloupe.

OTHER COMMON NAMES.—taburete (Cuba); cheakyberry (Saba).

737. *Palicourea domingensis* (Jacq.) DC.

Flowering twig (above), fruits (lower right), natural size.

738. Cachimbo, yellow palicourea ***Palicourea riparia* Benth.**

Abundant in the understory of moist forests, this shrub or small tree is recognized by: (1) the opposite dark green, narrowly elliptic leaves long-pointed at both ends, thin or only slightly thickened, with small tufts of hairs where side veins join midrib beneath and 2 pairs of erect bristlelike scales (stipules) at base; (2) the many light yellow narrowly tubular flowers about ½ inch long in terminal flower clusters about as broad as long, with bright orange-red branches turning to purple, often more or less horizontal; and (3) the blackish, nearly round, fleshy fruits ¼–⅜ inch long and broad on branches which have turned red or purple.

Evergreen shrub 10 feet high or sometimes a small tree to 15 feet and 3 inches in trunk diameter. The bark is gray and smoothish to finely fissured. Inner bark is light green, slightly bitter and astringent. The twigs are dark green and hairless, with slightly enlarged ringed nodes. Paired very narrow pointed stipules 3/16 inch long form the bud.

The 2 leaves at a node are connected by 2 pairs of bristlelike scales (stipules) ⅛–3/16 inch long, which remain attached to twig after the leaves fall. Petioles are ¼–¾ inch long. Leaf blades are 3–8 inches long and 1¼–2½ inches broad, the edges not toothed, the upper surface dark green, slightly shiny, with the curved lateral veins sunken, and the lower surface pale green, slightly shiny. The leaves darken on drying.

Flower clusters (panicles) with spreading orange-red branches are 1–3 inches long and broad beyond the purplish red main stalk 1½–5 inches long. The many short-stalked flowers open a few at a time. The yellowish tubular base (hypanthium) about 1/16 inch long and broad bears the reddish-tinged 5-lobed calyx nearly as long; the light yellow tubular corolla ⅜–½ inch long and ⅛ inch broad, slightly swollen at base, has 5 short-pointed, slightly hairy lobes ¼ inch across; the 5 stamens are attached inside the corolla tube; and the pistil is composed of inferior 2-celled ovary, slender style, and 2-forked stigma.

The rounded, slightly flattened fruits (drupes) have juicy, almost tasteless, dark purplish flesh. There are 2 brown nutlets ⅜–¼ inch or less in length, with ridges. In flower and fruit throughout the year.

The wood is light brown, hard, and lightweight.

Abundant in understory of moist coastal, moist limestone, Luquillo, and Cordillera forests from sea level to 2,500 feet altitude throughout moist areas of Puerto Rico. Also in Tortola.

PUBLIC FORESTS AND PARK.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro, Vega; Sage Mountain.

RANGE.—Cuba, Jamaica, Puerto Rico and Tortola, and through Lesser Antilles from St. Kitts and Montserrat to Grenada and Trinidad. Also from Central America (Costa Rica) to Bolivia, Brazil, and Guianas.

OTHER COMMON NAMES.—palo de cachimbo (Puerto Rico); yellow-cedar (Tortola); café de monte, amargoso (Venezuela); yellow palicourea (English); bois puce (St. Lucia).

This species is closely related to No. 736, cachimbo, red palicourea, *Palicourea crocea* (Sw.) Roem. & Schult., and has been considered a variety or synonym of that earlier named species of broader distribution. The latter differs in having the paired stipules very slender and curved back, the flower clusters taller than broad, and the smaller red flowers ⅜ inch long from yellow or orange stalks.

738. Cachimbo, yellow palicourea *Palicourea riparia* Benth.

Fruiting twig (above), flowering twig (below), natural size.

739. Aquilón prieto ***Phialanthus grandifolius* Alain**

This resinous shrub or small tree rare in western mountains is identified by: (1) foliage resinous or sticky, the opposite leaves narrowly elliptic, 1–3½ inches long and ⅜–1 inch wide, slightly thickened and leathery; (2) buds and young leaves in a drop of whitish wax or resin; and (3) very small white and almost stalkless flowers crowded at leaf bases and nodes back of leaves, ⅛ inch long, with 4 long spoon-shaped papery calyx lobes, persistent on the top-shaped fruit.

An evergreen resinous shrub 8–12 feet high, rarely a small tree 15–25 feet and 3 inches in trunk diameter, with paired nearly horizontal branches. The bark is gray and smooth, the inner bark whitish and slightly bitter. The twigs are green, with minute hairs, and have stipules in form of sheath 1/16 inch high at the enlarged ringed nodes, branching in pairs, the side twigs short with nodes only ⅛–⅜ inch apart. Buds develop within a round drop of whitish or cream-colored wax or resin 1/16–⅛ inch long, and young leaves to ½ inch long are within a larger wax or resin covering.

The opposite leaves have very short petioles 1/16–⅛ inch long, with minute hairs. The blades are blunt at apex, short-pointed at base, turned under at edges, hairless, with midrib but without visible side veins, the upper surface green and slightly shiny, the lower surface yellow green with prominent midvein.

The flowers have a small funnel-shaped tubular base (hypanthium) 1/16 inch long, which bears the calyx with 4 long spoon-shaped papery lobes more than 1/16 inch long and other parts; the 4-lobed corolla shorter than calyx; 4 short stamens inserted on corolla; and pistil with inferior 2-celled ovary and slender style. The fruit (drupelike) has at apex the 4 enlarged papery light brown calyx lobes ⅛ inch long. Flowering and fruiting probably through the year.

The wood is light brown and hard.

The drops of wax or resin in which the buds and young leaves develop can be chewed but are tasteless.

Rare in upper montane shrub on dry ridges at 1,000–2,600 feet altitude in western Puerto Rico. On serpentine barrens.

PUBLIC FOREST.—Maricao.

RANGE.—Known only from western Puerto Rico.

This species named as new in 1965 is closely related to the next and may not be distinct. The genus *Phialanthus* has about 12 species, mostly in Cuba, but extends to Jamaica and Bahamas as well as Puerto Rico.

740. ***Phialanthus myrtilloides* Griseb.**

This shrub or small tree to 16 feet high and 3 inches in trunk diameter, much branched and resinous, is distinguished by smaller narrowly oblong thickened leaves ¾–1¾ inches long and ¼–½ inch wide, few flowers more than ⅛ inch long, and cylindric fruits 1/16 inch long. Rare on serpentine barrens at 1,000–1,300 feet altitude, Susúa Forest, collected first in 1950 by one of the authors. RANGE.—Bahamas, Cuba, Jamaica, and Puerto Rico. OTHER COMMON NAME.—candlewood (Bahamas).

739. Aquilón prieto

Phialanthus grandifolius Alain

Natural size.

741. Cachimbo común ***Psychotria berteriana* DC.**

The most common of the shrubby species of cachimbo reaching tree size, also one of the largest. It is distinguished by: (1) opposite elliptic thin leaves 3–8 inches long and 1¼–3½ inches wide, long-pointed at both ends and with many curved sunken side veins; (2) flowers about ¼ inch long and broad, with 5-lobed pale yellow to whitish corolla, many in large erect terminal clusters; and (3) many round black berries nearly ¼ inch in diameter.

An evergreen understory shrub or small tree to 20 feet high and 4 inches in trunk diameter. The bark is gray and smooth, the inner bark whitish and almost tasteless. Twigs are green, sometimes finely hairy, often slightly 4-angled, becoming enlarged at the ringed nodes.

The opposite leaves have paired light green 2-pointed stipules ⅛ inch long and slender petioles ½–2 inches long. Blades are not toothed on edges, green and hairless or nearly so on upper surface, light green and sometimes slightly hairy on the raised veins on lower surface.

Flower clusters (panicles) 3–7 inches long, long-stalked, with greenish branches. Flowers many, opening few at a time, short-stalked or stalkless, consisting of very short hairy yellow-green base (hypanthium) less than 1/16 inch long with 5 calyx lobes; tubular corolla 3/16 inch long with 5 short lobes, which sheds promptly; 5 short stamens in notches of corolla; and pistil with inferior ovary and threadlike 2-forked style.

Fruits many in grapelike clusters, slightly broader than long, with calyx at apex, green when immature, very juicy, dark purple within, slightly bitter. The 2 nutlets are ⅛ inch long, angled and with raised points at top. With flowers and fruits throughout the year.

The wood is whitish and hard.

Abundant in understory of mountain forests including dwarf forest at 1,500–4,000 feet altitude in eastern, central, and western mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico. Also through Lesser Antilles from St. Kitts and Nevis to Grenada and Trinidad. Also Nicaragua, Costa Rica, Panama, and Colombia.

OTHER COMMON NAMES.—cafetán, escobón (Dominican Republic); uva blanca (Nicaragua); café marron (Guadeloupe); café bois (Guadeloupe, Martinique); bois cabrit (Haiti).

Carlo Guiseppe Bertero (1789–1831), Italian scientist, discovered this species in Puerto Rico and the Dominican Republic in 1818. Afterwards it was found to have a wider distribution through the Antilles and on the continent.

41. Cachimbo común

Psychotria berteriana DC.

Flowering twig and fruits (upper right), natural size.

742. Cachimbo grande ***Psychotria grandis* Sw.**

This rare understory tree or shrub is distinguished by: (1) opposite large leaves mostly 8–13 inches long and 2½–5 inches wide, obovate or broadly oblanceolate, thin, almost stalkless; (2) flowers less than ¼ inch long, with tubular 5-lobed white corolla, many, crowded, almost stalkless on short side branches of erect long-stalked clusters; and (3) round red berries nearly ¼ inch in diameter.

An evergreen small tree or shrub 20 feet high, rarely to 35 feet and 5 inches in trunk diameter. The brown or gray bark is smoothish, slightly fissured, the inner bark whitish. The twigs are green, stout, slightly angled, with ringed nodes, hairless.

The opposite hairless leaves have paired large united, keeled long-pointed stipules about ¾ inch long, which shed before the leaves. Leaf blades are long- or short-pointed at apex, not toothed on edges, widest beyond middle, and tapering gradually to the almost stalkless base, blackening upon drying. The upper surface is shiny green with many curved side veins, and the lower surface dull green with prominent veins.

Flower clusters (panicles) terminal, large, 4–6 inches long on a long stalk. Flowers are composed of short hairy tubular base (hypanthium) less than 1/16 inch long with 5-toothed calyx; tubular white corolla ⅛–3/16 inch long with 5 short lobes; 5 short stamens in notches of corolla; and pistil with inferior 2-celled ovary, slender style, and 2-forked stigma. The fleshy fruits (drupes) are slightly grooved, containing 2 rounded light brown nutlets flattened on 1 side. Flowering and fruiting through the year.

The whitish wood is hard and brittle.

A rare understory tree of lower and upper Luquillo and Cordillera forests at 300–3,000 feet altitude in moist mountains and wet limestone hills of Puerto Rico.

PUBLIC FORESTS.—Carite, Luquillo, Maricao, Toro Negro.

RANGE.—Cuba, Jamaica, Hispaniola, and Puerto Rico. Also from Guatemala and British Honduras to Costa Rica and Panama and in Colombia, Venezuela, and Ecuador.

OTHER COMMON NAMES.—palo moro (Puerto Rico); tapa camino (Cuba); perlilla (Ecuador); balsamo, wild-coffee (English).

742. Cachimbo

Psychotria grandis Sw.

Fruits at left, and flowering twig, two-thirds natural size.

743. Cachimbo de gato ***Psychotria maleolens* Urban**

A shrub, rarely becoming a small tree in Maricao Forest, easily recognized by the bad odor of the foliage, especially strong and skunk-like when crushed. Other characters are: (1) opposite oblong leaves 1–3½ inches long and ⅜–1¼ inches wide, slightly thickened and stiff, with edges rolled under; (2) few small flowers ¼ inch long and broad, with tubular 5-lobed white corolla; and (3) elliptic red berries ⅜ inch long.

An evergreen shrub 3–10 feet high, rarely in Maricao Forest becoming a small tree to 15 feet high and 3 inches in trunk diameter; however, reported to reach 33 feet. The bark is gray and smooth. The twigs are green and finely hairy when young, becoming gray, with ringed nodes formed by the pointed sheathing stipules which shed early.

The opposite hairless leaves have short petioles ⅛–¼ inch long. Blades are long- or short-pointed at both ends, the upper surface shiny dark green, and the lower surface dull light green.

Flower clusters (panicles) terminal with few flowers on short stalks of less than ⅛ inch. The minute base (hypanthium) 1/16 inch long bears the 5-toothed calyx, white corolla about 3/16 inch long, 5 minute stamens in notches of corolla, and pistil with inferior ovary, slender style, and 2-forked stigma. The fleshy fruits have calyx at apex and are 10-ribbed when dry. There is 1 brown nutlet 5/16 inch long. Flowering and fruiting through the year.

Wood light brown, hard.

Locally common as an understory shrub in lower and upper Luquillo and Cordillera forests and dwarf forest at 1,800–4,000 feet altitude in upper mountains of Puerto Rico.

PUBLIC FORESTS.—Carite, Guilarte, Luquillo, Maricao, Toro Negro.

RANGE.—Known only from Puerto Rico.

The appropriate scientific name refers to the bad odor.

Aroma (*Lasianthus lanceolatus* (Griseb.) G. Maza; synonym *L. moralesii* (Griseb.) C. Wright), is a similar, related ill-smelling understory shrub of mountains in Puerto Rico but not reaching tree size. It differs in its leaves often slightly larger with deeply sunken prominent curved side veins and network of veins, also longer petioles, flowers borne at stalkless base of leaves, the tubular white corolla with 4 widely spreading narrow lobes, and round white berries. Also in Hispaniola and Cuba.

743. Cachimbo de gato

Psychotria maleolens Urban

Natural size.

744. Cachimbo de Maricao — *Psychotria maricaensis* Urban

This shrub or small tree named for Maricao is found only in mountains of western Puerto Rico. It is distinguished by: (1) paired elliptic to obovate leaves 1¼–2¾ inches long and ¾–1¾ inches wide, slightly thickened and turned under at edges, with paired scales (stipules) forming sheath at base; (2) several stalkless small white flowers ¼ inch long in erect terminal clusters; and (3) fruit an elliptic reddish drupe ¼ inch long.

An evergreen shrub or sometimes a small tree to 20 feet high and 4 inches in trunk diameter, with many slender gray branches, hairless throughout. The bark is smooth and gray, the inner bark whitish and almost tasteless. Twigs are green, becoming gray.

The opposite leaves have at base paired scales (stipules) to ⅜ inch high, which shed early, leaving ring scar around twig. Blades are blunt at apex and narrowed to long-pointed base and petiole of ⅛–½ inch, slightly thickened, shiny green above and paler beneath.

The flowers stalkless at ends of branched clusters (panicles) 1–2 inches long consist of cuplike base with wavy border of calyx, white tubular corolla with 5 spreading lobes, 5 stamens within tube, and pistil with inferior 2-celled ovary, slender style, and 2-forked stigma. The berries with rim of calyx at apex contain a nutlet nearly 3/16 inch long with ridges and grooves. Flowering and fruiting irregularly through the year.

The wood is whitish and hard.

Uncommon in understory at middle and higher altitudes of about 1,000–2,500 feet in upper Cordillera forest, especially on serpentine bedrock, in western Puerto Rico.

PUBLIC FORESTS.—Maricao, Susúa.

RANGE.—Known only from western Puerto Rico.

744. Cachimbo de Maricao *Psychotria maricaensis* Urban

Twig with flowers and fruits (left), natural size; fruiting twig (lower right), twice natural size.

745. Cachimbo de Mona ***Psychotria nutans* Sw.**

This small tree rare at Mona Island is recognized by: (1) opposite oblanceolate or narrowly elliptic thin leaves blunt or short-pointed at apex and tapering to long-pointed base; (2) small flowers less than 3/8 inch long with white tubular 5-lobed corolla; and (3) red elliptic berries about 1/4 inch long.

A small evergreen tree to 15 feet high and 6 inches in trunk diameter, with spreading crown. The bark is very thick, with light brown corky ridges and deep furrows. The twigs have minute hairs when young, paired stipules 1/16 inch long, which form the ringed nodes, and become light gray.

The opposite leaves have slender petioles 1/4–3/8 inch long. Blades are 1 1/4–4 inches long and 1/2–1 1/4 inches wide, not toothed on edges, the upper surface dull dark green and hairless, with midvein and many curved side veins slightly sunken, and the lower surface light green with raised finely hairy brownish veins.

The flower clusters (panicles) terminal, less than 2 inches long, with few slender branches. Flowers few, composed of minute base (hypanthium), 5-toothed calyx, white tubular corolla 1/4 inch long with 5 lobes; 5 minute stamens in notches of corolla; and pistil with inferior ovary and slender style. The berries have calyx teeth at apex and are often ribbed. Collected with flowers and fruits in August.

The wood is light yellow and hard.

Rare at Bajura de los Cerezos in dry forest at 150 feet altitude on Mona Island.

RANGE.—Cuba, Hispaniola, Mona, and Antigua.

OTHER COMMON NAMES.—café cimarrón, penda, brilloso, cabra blanca, cabra santa (Dominican Republic); bois laitelle (Haiti).

While most related species are shrubs in the understory of wet forests, this species is a small tree in the dry forest. First collected on Mona Island in 1944. Not found in Puerto Rico but recorded eastward at Antigua.

745. Cachimbo de Mona *Psychotria nutans* Sw.

Flowering twig (upper left), fruiting twig (lower right), natural size.

746. Cordobancillo

Rondeletia inermis **(Spreng.) Krug & Urban**

Cordobancillo is a shrub or small tree widely distributed through Puerto Rico, with races differing in leaf shape and in hairiness. Distinguishing characters are: (1) paired, slender finely hairy twigs with ringed nodes formed by short-pointed stipules and with both long and short internodes; (2) opposite small, mostly elliptic leaves ending in abrupt point, with few curved side veins slightly sunken; (3) flowers $\frac{5}{16}$–$\frac{3}{8}$ inch long, 1 to few on short stalks at leaf bases, the hairy corolla with narrow tube and 4 rounded spreading lobes, whitish to yellow, pinkish, purple, or brown; and (4) seed capsule rounded, $\frac{1}{8}$ inch in diameter, gray, finely hairy, with 4 long calyx lobes persistent at apex.

Evergreen shrub or sometimes a small tree to 15 feet high and 3 inches in trunk diameter, infrequently vinelike. Bark gray, smoothish the inner bark light yellow, almost tasteless. The twigs are light green when young, becoming gray or light brown, usually finely hairy but often hairless. Paired pointed hairy stipules $\frac{1}{16}$ inch long, green but turning brown, form a pointed bud and ringed nodes.

The opposite leaves have finely hairy petioles $\frac{1}{8}$–$\frac{1}{4}$ inch long. Blades are mostly elliptic but vary greatly in shape and size from linear to oblong and obovate, mostly $\frac{3}{4}$–3 inches long and $\frac{3}{8}$–$1\frac{1}{2}$ inches wide, thin or slightly thickened, nearly hairless, short-pointed at base, not toothed on edges. The upper surface is green and slightly shiny, and the lower surface dull light green.

The fragrant flowers have an inferior rounded 2-celled hairy ovary $\frac{1}{16}$ inch long, which bears the other parts, including calyx with 4 whitish green hairy lobes nearly $\frac{1}{8}$ inch long; hairy corolla about $\frac{1}{4}$ inch long, pinkish in bud, with very narrow tube and 4 rounded spreading lobes of varying and changing color; 4 stamens in throat of corolla tube; and pistil with slender style and 2-lobed stigma. The fruit is a rounded seed capsule with calyx lobes bent back at apex, containing many minute seeds and persisting on old twigs. Flowering and fruiting through the year.

The wood is light brown and hard.

Uncommon but widely distributed through Puerto Rico in moist limestone forest, both north and south, and in central mountains at 200–3,500 feet altitude. Also in Muertos.

PUBLIC FORESTS.—Cambalache, Guajataca, Guánica, Maricao, Río Abajo, Susúa, Vega.

RANGE.—Puerto Rico and Muertos only.

746. Cordobancillo

Rondeletia inermis (Spreng.) Krug & Urban

Flowering twig (left), fruiting twig (lower right), natural size.

747. Cordobancillo peludo ***Rondeletia pilosa* Sw.**

This shrub or small tree of lowland forests is characterized by: (1) young twigs and under surfaces of leaves soft hairy; (2) opposite elliptic leaves 1½–4 inches long and ½–2½ inches wide, with few long curved sunken side veins; (3) usually 3 lateral flowers ⅝ inch long at end of long stalk, the hairy calyx with 4 long narrow lobes, and the hairy corolla with very narrow gray tube and 4 rounded dark red lobes; and (4) seed capsule rounded, 3/16 inch in diameter, hairy, with 4 long calyx lobes persistent at apex.

Evergreen shrub or small tree to 15 feet high. Bark gray, smooth. Twigs long, slender, forking, with dense long hairs when young, ringed at nodes.

Leaves opposite, with hairy petioles ⅛–¼ inch long and paired triangular pointed hairy stipules about ⅜ inch long. Blades are short- or long-pointed at apex, short-pointed to notched at base, not toothed at edges, slightly thickened, the upper surface green with pressed hairs, and the lower surface light green and densely soft hairy with long hairs and prominent side veins.

Flowers usually 3 at a leaf base at end of a long stalk ¾–2½ inches long, consisting of very hairy cuplike base (hypanthium) 1/16 inch long which bears the other parts, including hairy green calyx with 4 narrow red-tipped lobes ¼–½ inch long; hairy 4-lobed corolla nearly ⅝ inch long; 4 stamens in throat of corolla tube; and pistil with inferior 2-celled ovary containing many ovules, slender style, and 2-lobed stigma. The rounded seed capsules are 2-celled and contain many minute brown seeds. Flowering and fruiting probably through the year.

Uncommon in coastal thickets, roadsides, and lowland forests of eastern and southern Puerto Rico, for example, near Fajardo and at Playa de Naguabo. Also St. Croix, St. Thomas, St. John, Tortola and Virgin Gorda.

PUBLIC PARKS.—Virgin Islands, Gorda Peak.

RANGE.—Puerto Rico and Virgin Islands. Recorded also from Montserrat.

747. Cordobancillo peludo *Rondeletia pilosa* Sw.

Natural size.

748. Voa-vanga ***Vangueria madagascariensis* J. F. Gmel.***

This shrub or small tree with edible fruits is a rare introduction in Puerto Rico. Characters for recognition are: (1) opposite ovate or elliptic leaves 5–9 inches long and 2½–4½ inches wide, rounded at base and short-pointed at apex; (2) many small greenish flowers about ¼ inch long and wide, clustered and short-stalked on twigs back of new leaves; and (3) round smooth fruits (drupes) 1¼–1¾ inches in diameter, green with white dots.

A deciduous planted shrub or tree 20 feet or more in height and 6 inches in trunk diameter. Bark brown gray, smoothish. Twigs are gray, with ringed nodes and sheath formed by greenish pointed stipules ⅓ inch long.

The opposite leaves have petioles ½ inch long. Blades are thin, hairless, with midrib and curved side veins slightly sunken, the upper surface dull green, and the lower surface light green.

The flower clusters (panicles) are about 2 inches long. Flowers are composed of minute basal cup (hypanthium), 5 calyx lobes, bell-shaped greenish corolla hairy in throat with 5 starlike lobes, 5 alternate stamens inserted in throat, and pistil with inferior 4–5-celled ovary, long style, and enlarged stigma. The fruit has 5 pointed calyx lobes at apex and contains brownish sour pulp and 5 or fewer large stones. Collected with flowers in spring.

The slightly sour fruits suggesting a green apple are eaten raw or stewed. If not picked when mature, they shrivel and become brownish and have a flavor like tamarind or tamarindo, No. 80, *Tamarindus indica* L.*

Rarely cultivated at low altitudes in Puerto Rico, scattered on southern coast, also in Virgin Islands. A few trees at Youngham Park, Bayamón.

RANGE.—Native of tropical Africa and Madagascar but occasionally grown elsewhere in the tropics for the edible fruits. Recorded as naturalized at Guadeloupe.

OTHER COMMON NAMES.—tamarindo americano, tamarindo forastero (Puerto Rico); Spanish tamarind (English); tamarinier des Indes (Guadeloupe).

BOTANICAL SYNONYM.—*Vangueria edulis* Vahl.

The generic name is from the common name.

748. Voa-vanga

Vangueria madagascariensis J. F. Gmel.*

Leafy twig (above), flowering twig (lower left), two-thirds natural size.

HONEYSUCKLE FAMILY (CAPRIFOLIACEAE*)

Shrubs, sometimes woody vines and small trees, rarely herbs, known by: (1) leaves opposite, usually simple (pinnate in *Sambucus*), stipules none or minute; (2) flowers usually small, sometimes showy, often in cymes, bisexual, regular or irregular, with minute calyx of 5 (4) teeth or lobes, tubular corolla of 5 (4) lobes, stamens 5 (4) alternate and inserted in tube, and pistil with inferior ovary of 1–5 cells each with 1 ovule, style, and stigma to 5 lobes; and (3) fruit a berry or drupe. One introduced tree species.

749. Saúco, Florida elder — *Sambucus simpsonii* Rehd.*

Saúco, a shrub or small tree uncommonly planted in gardens and around rural homes in mountains, is recognized by: (1) stout angled twigs ringed at nodes, with large white pith; (2) opposite pinnately compound leaves with 3–7 elliptic finely toothed leaflets or partly twice pinnate with up to 13 leaflets; (3) large flat-topped terminal clusters of many small white flowers $\frac{1}{4}$–$\frac{5}{16}$ inch wide, 4–5-parted; and (4) many small black berries $\frac{1}{4}$ inch in diameter, rarely produced in Puerto Rico.

Evergreen spreading shrub mostly less than 10 feet high, sometimes 12–15 feet and 2–4 inches in trunk diameter and treelike. Bark light brown with raised dots (lenticels) and ringed nodes, smooth or becoming fissured and rough. Inner bark is white and tasteless. The twigs are light green, purplish at the ringed nodes, older twigs with light dots (lenticels), hairless. Buds are composed of minute leaves and paired stipules.

The paired leaves 5–9 inches long are pinnately compound, their stout yellow-green axes enlarged at base to form a ring around twig. The leaflets are paired except at end, or the lower replaced by 2 or 3 in a short axis (bipinnate). Leaflets elliptic, $1\frac{1}{4}$–$4\frac{1}{2}$ inches long, $\frac{1}{2}$–2 inches wide, short-stalked, finely toothed, ending in a long narrow point, short-pointed at base, thin, the upper surface shiny green and hairless, the lower surface dull light green with minute hairs along midvein.

Flower clusters (panicles or corymbs) are erect at end of twig, flat-topped, much branched, 4–8 inches across. Flowers many, small, fragrant, shedding early, consisting of whitish green 4–5-lobed calyx; white corolla with very short tube and 4–5 spreading elliptic lobes; 4–5 short stamens inserted on corolla between lobes; and pistil with half inferior ovary 4–5-celled with 1 ovule in each cell and broad stigma. Flowering through the year.

The fruits are round black berries, with calyx at apex, juicy and containing 5 or fewer 1-seeded nutlets, rarely formed in Puerto Rico. Britton and Wilson (*10;* 6:259) reported that they did not find this species fruiting in the West Indies. However, a specimen from Río Abajo Forest has fruits, and a fruiting tree was seen near Isabel Segunda, Vieques.

The wood is light brown and soft.

Planted for ornament and home medicine in gardens and around rural homes in mountains of Puerto Rico and Virgin Islands but uncommon. In Tortola occasionally cultivated and long persistent. Rarely setting seed and thus not native or naturalized.

PUBLIC FORESTS.—Luquillo, Río Abajo.

RANGE.—Coastal plain of southeastern United States from Florida to Louisiana. Introduced in Greater Antilles and Lesser Antilles and Central America.

OTHER COMMON NAMES.—saúco (Spanish); elder (English); saúco blanco (Dominican Republic, Cuba); Florida elder, Gulf elder, southern elder (United States); West Indian elder (Babados); fleur sureau (Haiti); elder, sureau (Dominica).

This elder is closely related to American elder (*Sambucus canadensis* L.), a species of wide distribution in eastern United States, and has been treated also as a variety of the latter.

749. Saúco, Florida elder *Sambucus simpsonii* Rehd.*

Flowering twig, two-thirds natural size.

COMPOSITE FAMILY (COMPOSITAE)

Herbs and few shrubs, in the tropics sometimes small to medium-sized trees, known by: (1) leaves generally alternate, sometimes opposite, simple, thin, often toothed or lobed, without stipules; (2) flowers crowded in heads bordered by green persistent scales (bracts), small, bisexual or unisexual, with calyx reduced to hairs or scales (pappus), corolla tubular of 1 or 2 kinds, regular with 5 teeth (disk flower) or irregular with ray or ligule (ray flower), 5 stamens inserted in tube and united by anthers, and pistil with inferior 1-celled ovary containing 1 ovule and with 2-forked style; and (3) fruit an akene, often flattened, with hairs or scales (pappus) at apex. Also vol. 1, p. 526.

Key to species

A. Leaves broadly ovate, with irregular long and short teeth, with mostly long petioles of 1–4 inches—250. Carruzo, *Clibadium erosum* (Sw.) DC.

AA. Leaves narrowly elliptic or ovate, finely saw-toothed, with short petioles less than ⅝ inch long—750. *Eupatorium portoricense.*

750. Guerrero — *Eupatorium portoricense* Urban

This handsome large shrub or small tree is distinguished by: (1) opposite narrowly elliptic or ovate leaves, finely saw-toothed, with many gland dots and dashes, fragrant; (2) many small stalkless heads about ¼ inch long, each with 5 or fewer white flowers in large erect terminal clusters; and (3) many dark gray seedlike fruits (akenes) ⅛ inch long, with ring of white hairs at apex.

A large evergreen aromatic shrub or small tree to 20 feet in height and 3–6 inches in trunk diameter. Bark gray, smoothish, the thin inner bark greenish and slightly bitter. Twigs green, hairless, slightly angled, becoming light brown, with rings at nodes.

Leaves opposite, hairless, with petioles less than ⅝ inch long. Blades 3–6 inches long and 1–2½ inches wide, mostly long-pointed at apex and short-pointed at base, finely saw-toothed or wavy-toothed on edges, thin, green on both surfaces, with many gland dots and dashes visible against the light with naked eye or hand lens.

Flower heads clustered and stalkless at ends of branches of erect terminal clusters (corymbs), spreading and slightly flattened and 6–9 inches or more across. The heads are narrowly cylindric, about ¼ inch long and less than ⅛ inch wide, bordered by several overlapping scales, and contain 5 or fewer regular (disk) flowers. The narrow white flowers about ¼ inch long consist of inferior ovary bearing at apex a ring of white hairs, tubular white corolla 5-toothed at apex, 5 stamens inside tube and united by anthers, and 2-forked protruding style. The seedlike fruits (akenes) are angled and finely hairy and have at apex a ring of white spreading hairs ⅛ inch long. Flowering mainly from November to February and maturing fruits in winter.

The wood is whitish and hard.

Sometimes planted for the fragrant foliage.

Common in moist limestone and lower and upper Cordillera forests at 200–3,000 feet altitude in moist mountains throughout Puerto Rico. Also Vieques.

PUBLIC FORESTS.—Cambalache, Carite, Guajataca, Luquillo, Maricao, Río Abajo, Vega.

RANGE.—Puerto Rico and Vieques only.

BOTANICAL SYNONYM.—*Critonia portoricensis* (Urban) Britton & Wilson.

This Puerto Rican species and about 30 others mostly from the West Indies, Mexico, and Central America have been placed also in the genus *Critonia.* That segregate is recognized by the gland dots and dashes in the leaves.

750. Guerrero

Eupatorium portoricense Urban

Flowering twig (above), flower heads (lower left), fruits (lower right), natural size.

SUPPLEMENT TO "COMMON TREES OF PUERTO RICO AND THE VIRGIN ISLANDS" (VOLUME 1)

Additional notes about many species in the first volume have been assembled here to bring it up-to-date and comparable with the second. Also, other details have been compiled, and errors have been corrected. The species are in numerical order with the same number (1–250) followed by the common and scientific names.

Several changes in accepted scientific names have been made below and in the keys to conform to current usage. References have been cited in the Introduction under Work by Others. It was impractical to revise the nomenclature during the long interval between preparation of the manuscript and appearance of the editions in English and Spanish, while the book was delayed and partly set in type. Also certain proposals to amend the International Code of Botanical Nomenclature were pending. A few recent transfers in generic names based upon taxonomic judgment have not been adopted but have been cited as botanical synonyms. In the list below, any changed scientific name precedes the replaced name appearing in the first volume. A few other common names in Puerto Rico and the Virgin Islands have been noted.

Larger maximum sizes, both height and trunk diameter, of trees in Puerto Rico and the Virgin Islands have been taken from the field observations by Woodbury.

Much new information on geographic distribution within Puerto Rico and the Virgin Islands has been compiled from field work and recent publications. Additional island records, mostly of smaller islands, have been cited. The species lists for additional public forests have been enlarged by field work. Estate Thomas Experimental Forest, a new research area on St. Croix, has been included. Also, distribution is given for the four national parks in the Virgin Islands, all of which were established after the first volume was prepared.

1. Helecho gigante, tree-fern, *Cyathea arborea* (L.) J. E. Smith. Public park.—Sage Mountain.

2. Caobilla, podocarp, *Podocarpus coriaceus* L. C. Rich. This genus is now placed in the podocarp family (Podocarpaceae); described briefly on page 54.

3. Bambú, common bamboo, *Bambusa vulgaris* Schrad.* Public forests.—Cambalache, Carite, Guajataca, Guilarte, Luquillo, Maricao, Río Abajo, Susúa, Toro Negro, Vega.

4. Corozo, prickly palm, Puerto Rico acrocomia, *Acrocomia media* O. F. Cook. Additional public forest.—Guajataca.

5. Palma de coyor, *Aiphanes acanthophylla* (Mart.) Burret. Additional public forests.—Guajataca, Luquillo.

6. Palma de coco, coconut, *Cocos nucifera* L.* Additional islands.—Jost Van Dyke, Virgin Gorda, Anegada. Public forests and parks.—Aguirre, Boquerón, Cambalache, Guánica, Luquillo, San Juan, Susúa; Buck Island Reef, Virgin Islands.

7. Palma de sierra, sierra palm, *Prestoea montana* (R. Grah.) Nichols. Replaces *Euterpe globosa* Gaertn.

8. Palma de lluvia, *Gaussia attenuata* (O. F. Cook) Beccari. Additional public forest.—Vega.

9. Palma real, royalpalm, Puerto Rico royalpalm, *Roystonea borinquena* O. F. Cook. Additional public forest.—Río Abajo.

10. Palma de sombrero, Puerto Rico palmetto, *Sabal causiarum* (O. F. Cook) Beccari. Public forest.—Cambalache. 270, Hispaniola palmetto, *Sabal domingensis* Beccari,* replaces Bermuda palmetto or bulltyre, *Sabal bermudana* Bailey,* formerly referred to *S. blackburnianum* Glazebrook.

11. Casuarina, Australian beefwood, horsetail casuarina, *Casuarina equisetifolia* L.* Public forests and park.—Cambalache, Guánica, Luquillo, Maricao, Río Abajo, Susúa; Virgin Islands.

12. Higuillo, *Piper aduncum* L. Small tree to 30 feet high and 6 inches in trunk diameter.

13. Azafrán, *Hedyosmum arborescens* Sw. Additional public forest.—Toro Negro.

16. Guacimilla, false jacocalalu, Florida trema, *Trema micrantha* (L.) Blume. Additional islands.—Jost Van Dyke, Virgin Gorda. Additional public forests and parks.—Cambalache, Guajataca, Guilarte, Maricao, Río Abajo, Susúa; Virgin Islands, Sage Mountain.

20. Yagrumo hembra, trumpet-tree, *Cecropia peltata* L. Corrected spelling. Public park.—Virgin Islands.

21. Palo de goma, India-rubber fig, *Ficus elastica* Roxb. ex Hornem.* Change in author citation.

22. Jagüey blanco, shortleaf fig, *Ficus citrifolia* Mill. Replaces *F. laevigata* Vahl. Additional islands.—Desecheo, Muertos, Palominos, Jost Van Dyke, Virgin Gorda. Public parks.—Buck Island Reef, Virgin Islands, Sage Mountain.

23. Laurel de la India, India-laurel fig, *Ficus microcarpa* L. f.* Replaces *F. retusa* L.* Public forest.—Guánica.

24. Jagüey, colorado, *Ficus perforata* L. Replaces *F. sintenisii* Warb.

25. Uvilla, doveplum, *Coccoloba diversifolia* Jacq. Medium-sized tree to 60 feet high and 2 feet in trunk diameter. Public forests.—Guilarte, Río Abajo.

27. Ortegón, *Coccoloba swartzii* Meisn. Medium-sized tree to 60 feet high and 2 feet in trunk diameter. Public parks.—Virgin Islands, Gorda Peak.

28. Uva de playa, seagrape, *Coccoloba uvifera* (L.) L. Additional islands.—Palominos, Jost Van Dyke. Public forests and parks.—Aguirre, Boquerón, Guánica, Luquillo, San Juan; Buck Island Reef, Virgin Islands. Other common name.—grape-tree (Jost Van Dyke).

29. Calambreña, chicory-grape, *Coccoloba venosa* L. Additional island.—Jost Van Dyke. Public park.—Virgin Islands.

30. Triplaris, anttree, *Triplaris cumingiana* Fisch. & Mey.* Replaces *T. americana* L.* as the common introduced species in Puerto Rico.

32. Corcho blanco, water mampoo, *Pisonia subcordata* Sw. Additional islands.—Jost Van Dyke, Virgin Gorda. Additional public forests and parks.—Cambalache, Luquillo, Susúa; Buck Island Reef, Virgin Islands, Gorda Peak.

33. Corcho, black mampoo, *Guapira fragrans* (Dum.-Cours.) Little. Replaces *Torrubia fragrans* (Dum.-Cours.) Standley. Large tree to 80 feet high. Additional island.—Desecheo. Additional public forests and parks.—Carite, Guánica, Maricao, Susúa, Estate Thomas; Buck Island Reef, Virgin Islands, Sage Mountain. 315, Barrehorno, *Guapira discolor* (Spreng.) Little, replaces *Torrubia discolor* (Spreng.) Britton.

35. Laurel sabino, *Magnolia splendens* Urban. Large tree to 95 feet high and 5 feet in trunk diameter.

36. Guanábana cimarrona, wild soursop, *Annona montana* Macfadyen. Also from Quebradillas to Aguadilla and Lower Río Blanco.

37. Guanábana, soursop, *Annona muricata* L.* Additional island.—Jost Van Dyke. Public forests and park.—Cambalache, Guajataca, Luquillo, Río Abajo, San Juan, Susúa, Estate Thomas; Virgin Islands.

38. Corazón, custard-apple, *Annona reticulata* L.* Additional island.—Virgin Gorda. Additional public forest and park.—Maricao; Virgin Islands.

39. Anón, sugar-apple, *Annona squamosa* L.* Additional island.—Jost Van Dyke. Public forest and park.—Estate Thomas; Virgin Islands. Other common name.—apple (Jost Van Dyke).

42. Guajón, *Beilschmiedia pendula* (Sw.) Benth. & Hook. f. Large tree to 90 feet high and 4 feet in trunk diameter. Additional public forest.—Toro Negro.

43. Canelilla, *Licaria salicifolia* (Sw.) Kosterm. Public parks.—Virgin Islands, Sage Mountain.

44. Palo de misanteco, Gulf licaria, *Licaria triandra* (Sw.) Kosterm. Additional public forests.—Cambalache, Susúa.

45. Laurel avispillo, Jamaica nectandra, *Nectandra coriacea* (Sw.) Griseb. Additional islands.—Jost Van Dyke, Virgin Gorda. Public parks.—Virgin Islands, Sage Mountain, Gorda Peak.

46. Canelón, *Ocotea cuneata* (Griseb.) Urban. Additional public forest.—Vega.

47. Laurel espada, *Ocotea floribunda* (Sw.) Mez. Public park.—Virgin Islands.

51. Aguacate, avocado, *Persea americana* Mill.* Additional island.—Jost Van Dyke. Public forests and park.—Cambalache, Carite, Guajataca, Luquillo, Maricao, Río Abajo, San Juan, Susúa; Virgin Islands.

53. Burro prieto, Jamaica caper, *Capparis cynophallophora* L. Additional island.—Virgin Gorda. Additional public forests and parks.—Cambalache, Maricao, Susúa; Buck Island Reef, Virgin Islands, Gorda Peak.

55. Palo bobo, *Brunellia comocladifolia* Humb. & Bonpl. Additional public forest.—Guajataca.

56. Oreganillo, *Weinmannia pinnata* L. Additional public forest.—Maricao.

58. Aroma, sweet acacia, *Acacia farnesiana* (L.) Willd.* Additional island.—Jost Van Dyke. Additional public forest and park.—Estate Thomas; Virgin Islands. Other common name.—casha-tree (Jost Van Dyke).

60. Acacia amarilla, tibet, lebbek, *Albizia lebbeck* (L.) Benth.* Change in spelling. Public forests and park.—Luquillo, Maricao, Susúa, Estate Thomas; Virgin Islands.

62. Guamá, "sweetpea," *Inga fagifolia* (L.) Willd. Relaces *I. laurina* (Sw.) Willd. Public parks.—Virgin Islands, Sage Mountain.

65. Zarcilla, tantan, leadtree, *Leucaena leucocephala* (Lam.) de Wit. Replaces *L. glauca* (L.) Benth. Though deciduous in dry areas, this species is evergreen in the Virgin Islands. Additional islands.—Muertos, Jost Van Dyke. Additional public forest and parks.—Estate Thomas; Buck Island Reef, Virgin Islands.

66. Cojóbana, *Piptadenia peregrina* (L.) Benth. Perhaps introduced by prehistoric Indians. Additional botanical synonym.—*Anadenanthera peregrina* (L.) Speg.

68. Guamá americano, guamuchil, *Pithecellobium dulce* (Roxb.) Benth.* The favorite host of the introduced treehopper or membracid (*Umbonia crassicornis*) commonly known as chinche espinosa or thornbug.

69. Samán, raintree, *Pithecellobium saman* (Jacq.) Benth.* Public forest and park.—Aguirre; Virgin Islands.

70. Bayahonda, mesquite, *Prosopis juliflora* (Sw.) DC.* Additional public forests.—Boquerón, Cambalache.

71. Mariposa, butterfly bauhinia, *Bauhinia monandra* Kurz.* Public forests and park.—Cambalache, Susúa; Virgin Islands.

72. Cañafístula, golden-shower, *Cassia fistula* L.* Public forest and park.—Susúa; Virgin Islands.

74. Casia de Siam, Siamese cassia, *Cassia siamea* Lam.* Public forests and park.—Guajataca, Guánica, Luquillo, Río Abajo; Virgin Islands.

75. Flamboyán, flamboyant-tree, *Delonix regia* (Bojer) Raf.* Additional islands.—Jost Van Dyke, Virgin Gorda. Public forests and park.—Cambalache, Guajataca, Guánica, Luquillo, Maricao, Río Abajo, Susúa; Virgin Islands.

76. Algarrobo, West-Indian-locust, courbaril, *Hymenaea courbaril* L. Additional island.—Virgin Gorda. Public parks.—Virgin Islands, Gorda Peak.

77. Palo de rayo, Jerusalem-thorn, *Parkinsonia aculeata* L.* Additional island.—Jost Van Dyke.

78. Flamboyán amarillo, yellow flamboyant, *Peltophorum inerme* (Roxb.) Naves.* Public forest—Luquillo.

79. Cóbana negra, *Stahlia monosperma* (Tul.) Urban. Additional public forests.—Guánica, Susúa.

80. Tamarindo, tamarind, *Tamarindus indica* L.* Additional islands.—Muertos, Virgin Gorda. Additional public forests and parks.—Guánica, Susúa, Estate Thomas; Buck Island Reef, Virgin Islands.

Faboideae. Replaces Lotoideae.

81. Moca, cabbage angelin, *Andira inermis* (W. Wright) DC. Change in author citation. Large tree to 100 feet high and 2 feet in trunk diameter. Public parks.—Virgin Islands, Sage Mountain.

83. Bucare, swamp immortelle, *Erythrina fusca* Lour.* Replaces *E. glauca* Willd.*

84. Bucayo gigante, mountain immortelle, *Erythrina poeppigiana* (Walp.) O. F. Cook.* Public forests.—Maricao, Río Abajo, Susúa.

85. Mata-ratón, mother-of-cocoa, *Gliricidia sepium* (Jacq.) Kunth ex Griseb.* Change in author citation. Additional island.—Virgin Gorda.

86. Retama, *Lonchocarpus pentaphyllus* (Poir.) DC. Replaces *L. latifolius* (Willd.) H.B.K. Large tree to 70 feet high and 1 foot in trunk diameter. Additional public forest.—Maricao.

87. Palo de matos, *Ormosia krugii* Urban. Additional public forests.—Guajataca, Maricao.

88. Tachuelo, fustic, *Pictetia aculeata* (Vahl) Urban. Additional islands.—Palominos, Jost Van Dyke.

92. Indio, *Erythroxylum areolatum* L. Changed spelling. Additional public forests.—Cambalache, Maricao, Susúa.

93. Guayacán, common lignumvitae, *Guaiacum officinale* L. A tree to 3 feet in trunk diameter.

95. Tea, sea amyris, *Amyris elemifera* L. Additional islands.—Jost Van Dyke, Virgin Gorda. Additional forests and parks.—Cambalache, Maricao; Buck Island Reef, Virgin Islands, Gorda Peak.

96. Limón agrio, lime, *Citrus aurantifolia* (L.) Swingle.* Additional island.—Virgin Gorda. Public forests and parks.—Cambalache, Guajataca, Guánica, Luquillo, Río Abajo, Susúa; Buck Island Reef, Virgin Islands.

97. Naranja agria, sour orange, *Citrus aurantium* L.* Additional public forests.—Guilarte, Maricao, Susúa.

98. Limón de cabro, lemon, *Citrus limon* (L.) Burm. f.* Additional public forests.—Guajataca, Susúa.

99. Toronja, grapefruit, *Citrus paradisi* Macfadyen.* Public forests.—Cambalache, Guajataca, Río Abajo, Susúa.

100. China, sweet orange, *Citrus sinensis* Osbeck.* Additional public forest.—Susúa.

102. Espino rubial, white-prickle, Martinique prickly-ash, *Zanthoxylum martinicense* (Lam.) DC. Large tree to 90 feet high. Public parks.—Virgin Islands, Sage Mountain.

103. Palo rubio, yellow-prickle, yellow prickly-ash, *Zanthoxylum monophyllum* (Lam.) P. Wilson. Additional islands.—Palominos, Jost Van Dyke. Public park.—Virgin Islands.

104. Guarema, bitterbush, *Picramnia pentandra* Sw. Also Coama area. Additional public forest and park.—Guajataca, Sage Mountain.

105. Almácigo, turpentine-tree, gumbo-limbo, *Bursera simaruba* (L.) Sarg. Large tree to 70 feet high and 3 feet in trunk diameter. Additional islands.—Muertos, Palominos, Jost Van Dyke, Virgin Gorda. Additional public forest and parks.—Estate Thomas; Buck Island Reef, Virgin Islands.

107. Masa, *Tetragastris balsamifera* (Sw.) Oken. Change in author citation. Additional island.—Tortola. Public park.—Sage Mountain.

108. Cedro hembra, Spanish-cedar, *Cedrela odorata* L. Large tree to 5 feet in trunk diameter. Additional public forest.—Luquillo.*

109. Guaraguao, American muskwood, *Guarea guidonia* (L.) Sleumer. Replaces *G.*

trichilioides L. Additional public forest.—Susúa.

110. Alelaila, chinaberry, *Melia azedarach* L.* Public forests and park.—Guánica, Susúa, Estate Thomas; Virgin Islands.

111. Caoba hondureña, Honduras mahogany, *Swietenia macrophylla* King.* Additional public forest and park.—Estate Thomas; Sage Mountain.

112. Caoba dominicana, Dominican mahogany, West Indies mahogany, *Swietenia mahagoni* Jacq.* Additional public forests and parks. —Vega, Estate Thomas; Virgin Islands, Sage Mountain.

113. Tinacio, broomstick, *Trichilia hirta* L. Additional public forests and park.—Guajataca, Luquillo, Maricao, Río Abajo, Vega; Virgin Islands.

114. Gaeta, *Trichilia pallida* Sw. Medium-sized tree to 40 feet high and 8 inches in trunk diameter. Additional public forests.—Cambalache, Guajataca, Maricao, Río Abajo, Vega.

115. Maricao, *Byrsonima coriacea* (Sw.) DC. Additional island.—Virgin Gorda. Additional public forests and parks.—Guajataca, Guánica, Río Abajo, Vega; Virgin Islands, Sage Mountain. Other common names.—maricao amarillo, maricao colorado (Puerto Rico).

116. Maricao cimarrón, *Byrsonima crassifolia* (L.) H.B.K. Additional public forests.—Carite, Maricao.

117. Violeta, violet-tree, *Polygala cowellii* (Britton) Blake. Additional public forests.—Cambalache, Guajataca, Maricao, Río Abajo, Susúa.

118. Achiotillo, *Alchornea latifolia* Sw. Large tree to 70 feet high. Additional public forests.—Guajataca, Susúa.

119. Palo de galina, *Alchorneopsis portoricensis* Urban. Additional public forest.—Maricao.

122. Rascaso, *Euphorbia petiolaris* Sims. Additional island.—Jost Van Dyke. Public park.—Virgin Islands.

123. Yaití, oysterwood, *Gymnanthes lucida* Sw. The sap is watery rather than white. Additional island.—Jost Van Dyke. Additional public forest and parks.—San Juan; Buck Island Reef, Virgin Islands.

124. Manzanillo, manchineel, *Hippomane mancinella* L. Additional islands.—Muertos, Palominos, Anegada. Public parks.—Buck Island Reef, Virgin Islands.

128. Millo, *Margaritaria nobilis* L. f. Replaces *Phyllanthus nobilis* (L. f.) Muell.-Arg. A medium-sized tree to 60 feet high and 2½ feet in trunk diameter. Additional island.—Virgin Gorda. Additional public forests and parks.—Carite, Maricao, Río Abajo, Vega; Virgin Islands, Gorda Peak.

129. Tabaiba, *Sapium laurocerasus* Desf. Additional public forests.—Guajataca, Maricao.

130. Pajuil, cashew, *Anacardium occidentale* L. Small tree to 40 feet high and 1 foot in trunk diameter. Additional island.—Jost Van Dyke.*

131. Mango, *Mangifera indica* L.* Additional islands.—Jost Van Dyke, Virgin Gorda. Public forests.—Cambalache, Carite, Guajataca, Luquillo, Maricao, Río Abajo, Susúa.

132. Papayo, Florida poisontree, *Metopium toxiferum* (L.) Krug & Urban. Additional public forest.—Guajataca.

133. Jobo de la India, ambarella, *Spondias dulcis* Parkinson.* A tree to 70 feet high.

134. Jobo, hogplum, yellow mombin, *Spondias mombin* L. Additional islands.—Jost Van Dyke, Virgin Gorda. Public parks.—Virgin Islands, Gorda Peak. Other common name.—plum (Jost Van Dyke).

135. Ciruela del país, purple mombin, *Spondias purpurea* L.* Additional island.—Jost Van Dyke. Public forest and park.—Río Abajo; Virgin Islands.

136. Palo colorado, swamp cyrilla, *Cyrilla racemiflora* L. A giant tree near El Verde in the northwestern part of Luquillo Mountains has a trunk approximately 8 feet 7 inches in diameter.

137. Sauco cimarrón, *Turpinia paniculata* Vent. Rare near Bayamón and Dorado. Additional public forest and park.—Susúa; Sage Mountain.

138. Guara, *Cupania americana* L. Large tree to 90 feet high and 14 inches in trunk diameter. Additional island.—Tortola. Public park. —Sage Mountain.

140. Quenepa, kinep, Spanish-lime, *Melicoccus bijugatus* Jacq.* Additional islands.—Jost Van Dyke, Virgin Gorda. Public forests and parks.—Guánica, Estate Thomas; Virgin Islands, Buck Island Reef.

143. Ceboruquillo, *Thouinia striata* Radlk. Additional public forests.—Guánica, Vega.

144. Aguacatillo, *Meliosma herbertii* Rolfe. Additional public forest.—Maricao.

145. Abeyuelo, coffee colubrina, *Colubrina arborescens* (Mill.) Sarg. Medium-sized tree to 45 feet high and 8 inches in trunk diameter. Additional islands.—Muertos, Jost Van Dyke. Additional public forests and park.—Carite, Maricao, Estate Thomas; Virgin Islands.

146. Mabí, soldierwood, *Colubrina elliptica* (Sw.) Briz. & Stern. Replaces *C. reclinata* (L'Hér.) Brongn. Additional islands.—Desecheo, Jost Van Dyke, Virgin Gorda. Public parks.—Buck Island Reef, Virgin Islands.

147. Bariaco, "ironwood," leadwood, *Krugiodendron ferreum* (Vahl) Urban. Medium-sized tree to 40 feet high and 1 foot in trunk diameter. Additional islands.—Jost Van Dyke, Virgin Gorda. Additional public forests and parks.

—Cambalache, Río Abajo, Susúa, Vega; Buck Island Reef, Virgin Islands.

148. Cascarroya, *Ziziphus reticulata* (Vahl) DC. Replaces *Sarcomphalus reticulatus* (Vahl) Urban. Medium-sized tree to 50 feet high and 1 foot in trunk diameter. 491, *Ziziphus rignonii* Delponte, replaces *Sarcomphalus domingensis* (Spreng.) Krug & Urban. 492, *Ziziphus taylorii* (Britton) M. C. Johnst., replaces *Sarcomphalus taylorii* Britton.

150. Emajagua, sea hibiscus, *Hibiscus tiliaceus* L.* Additional public forests and park.—Maricao, Susúa; Virgin Islands.

151. Maga, *Montezuma speciosissima* Sessé & Moc. Additional public forest.—Guilarte.*

152. Emajagüilla, otaheita, portiatree, *Thespesia populnea* (L.) Soland.* Additional islands.—Palominos, Jost Van Dyke. Public forests and parks.—Aguirre, Gúanica, San Juan; Buck Island Reef, Virgin Islands.

153. Ceiba, silk-cotton-tree, *Ceiba pentandra* (L.) Gaertn. Additional islands.—Jost Van Dyke, Virgin Gorda. Additional public forest and park.—Guánica; Virgin Islands.

154. Guano, balsa, *Ochroma pyramidale* (Cav.) Urban. Additional public forests.—Guilarte, Maricao, Toro Nergo.

155. Garrocho, *Quararibea turbinata* (Sw.) Poir. Corrected spelling. Medium-sized tree to 40 feet high and 10 inches in trunk diameter. Public park.—Virgin Islands.

156. Guácima, jacocalalu, *Guazuma ulmifolia* Lam. Medium-sized tree to 70 feet high. Public parks.—Virgin Islands, Sage Mountain.

158. Cacao, chocolate-tree, *Theobroma cacao* L.* Public forests.—Luquillo, Río Abajo.

161. María, santa-maria, *Calophyllum calaba* L. Replaces *C. brasiliense* Camb. Medium-sized tree with trunk to 3 feet in diameter, the bark becoming deeply fissured. Additional public forest.—San Juan.*

162. Cupeíllo, *Clusia grisebachiana* (Planch. & Triana) Alain. Replaces *C. krugiana* Urban.

163. Cupey, wild-mammee, copey clusia, *Clusia rosea* Jacq. Additional islands.—Jost Van Dyke, Virgin Gorda. Public park.—Virgin Islands.

164. Mamey, mammee-apple, *Mammea americana* L. Public forests.—Cambalache, Luquillo, Maricao, Río Abajo.

166. Achiote, anatto, *Bixa orellana* L.* Public forests and park.—Guajataca, Río Abajo, Susúa; Virgin Islands.

170. Tostado, wild honey-tree, *Casearia decandra* Jacq. Public park.—Virgin Islands. 528, Talantrón, *Laetia procera* (Poepp. & Endl.) Eichl., replaces *Casearia bicolor* Urban.

171. Palo blanco, wild-coffee, *Casearia guianensis* (Aubl.) Urban. Medium-sized tree to 50 feet high and 5 inches in trunk diameter. Additional public forests and park.—Guajataca, Maricao, Río Abajo; Virgin Islands.

172. Cafeíllo, *Casearia sylvestris* Sw. Additional public forest and parks.—Maricao; Virgin Islands, Sage Mountain. Other common name.—palo de cotorro (Puerto Rico).

174. Lechosa, papaya, *Carica papaya* L.* Additional islands.—Jost Van Dyke, Virgin Gorda. Public forest.—Susúa.

175. Sebucán, dildo, *Cephalocereus royenii* (L.) Britton & Rose. Additional island.—Jost Van Dyke. Public parks.—Buck Island Reef, Virgin Islands. Additional botanical synonym. —*Pilosocereus royenii* (L.) Byles & Rowley.

176. Tuna de petate, pricklypear, *Opuntia rubescens* Salm-Dyck. Public parks.—Buck Island Reef, Virgin Islands.

177. Majagua brava, *Daphnopsis philippiana* Krug & Urban. Additional public forest.—Maricao.

178. Reina de las flores, queen-of-flowers, *Lagerstroemia speciosa* (L.) Pers.* Public forests.—Luquillo, Río Abajo.

179. Mangle colorado, mangrove, *Rhizophora mangle* L. Additional islands.—Jost Van Dyke, Virgin Gorda. Public park.—Virgin Islands.

180. Granadillo, *Buchenavia capitata* (Vahl) Eichl. A large tree to 90 feet high and 5 feet in trunk diameter. Additional public forest and park.—Cambalache; Sage Mountain.

181. Ucar, gregre, oxhorn bucida, *Bucida buceras* L. A large tree to 90 feet high and 6 feet in trunk diameter. Additional island.—Jost Van Dyke. Additional public forest and park.—Vega; Virgin Islands.

182. Mangle botón, button-mangrove, *Conocarpus erectus* L. Additional islands.—Muertos, Desecheo, Palominos. Public parks.—Buck Island Reef, Virgin Islands.

183. Mangle blanco, white-mangrove, *Laguncularia racemosa* (L.) Gaertn. f. Additional islands.—Jost Van Dyke, Virgin Gorda. Public parks.—Buck Island Reef, Virgin Islands.

184. Almendra, Indian-almond, *Terminalia catappa* L.* Public forests and park.—Luquillo, Maricao, Río Abajo, San Juan, Susúa; Virgin Islands.

186. Eucalipto, beakpod eucalyptus, *Eucalyptus robusta* J. E. Smith.* Additional public forests.—San Juan, Susúa. Other common names.—robusta eucalyptus, swamp-mahogany eucalyptus (Hawaii).

187. Guasábara, *Eugenia domingensis* Berg. Replaces *E. aeruginea* DC.

188. Pomarrosa, rose-apple, *Eugenia jambos* L.* Public parks.—Virgin Islands, Sage Mountain.

189. Manzana malaya, Malay-apple, *Eugenia malaccensis* L.* Public forest.—Maricao.

190. Hoja menuda, spiceberry eugenia, *Eugenia rhombea* (Berg) Krug & Urban. Additional public forest and parks.—Estate Thomas; Buck Island Reef, Virgin Islands. 572, Anguila,

boxleaf eugenia, *Eugenia foetida* Poir., replaces *E. myrtoides* Poir. 587, Guayabacón, *Myrcianthes fragrans* (Sw.) McVaugh, replaces *Eugenia fragrans* (Sw.) Willd. 588, Mirto, guavaberry, *Myrciaria floribunda* (West) Berg, *replaces Eugenia floribunda* West.

191. Guayabota, *Eugenia stahlii* (Kiaersk.) Krug & Urban. Additional public forest.—Maricao.

192. Cieneguillo, *Myrcia deflexa* (Poir.) DC. Additional public forest.—Susúa. 585, Hoja menuda, *Myrcia fallax* (A. Rich.) DC. replaces *M. berberis* DC.

193. Hoja menuda, *Myrcia splendens* (Sw.) DC. Medium-sized tree to 60 feet high and 8 inches in trunk diameter. Additional public forests and park.—Guajataca, Río Abajo, Susúa, Toro Negro; Sage Mountain.

194. Malagueta, bay-rum-tree, *Pimenta racemosa* (Mill.) J. W. Moore. Medium-sized tree to 65 feet high and 14 inches in trunk diameter. Additional island.—Virgin Gorda. Additional public forest and parks.—Guilarte; Sage Mountain, Gorda Peak.

195. Guayaba, common guava, *Psidium guajava* L.* Additional islands.—Jost Van Dyke, Virgin Gorda. Public forests and park.—Aguirre, Cambalache, Carite, Guajataca, Luquillo, Maricao, Río Abajo, San Juan, Susúa, Vega; Virgin Islands.

198. Camasey, *Miconia prasina* (Sw.) DC. Additional public forests and park.—Guajataca, Maricao; Sage Mountain. 599, Camasey, *Miconia affinis* DC., replaces *M. microcarpa* DC.

199. Verdiseco, *Tetrazygia elaeagnoides* (Sw.) DC. Additional island.—Virgin Gorda. Additional public forests and park.—Luquillo, Susúa; Virgin Islands.

200. Pollo, *Dendropanax arboreus* (L.) Decne. & Planch. Medium-sized tree to 60 feet high and 1 foot in trunk diameter. Public park.—Sage Mountain. Other common name.—palo blanco (Puerto Rico).

201. Yagrumo macho, matchwood, *Didymopanax morototoni* (Aubl.) Decne. & Planch. Public parks.—Virgin Islands, Sage Mountain.

202. Mameyuelo, *Ardisia obovata* Desv. Medium-sized tree to 55 feet high and 6 inches in trunk diameter. Additional island.—Jost Van Dyke. Additional public forests and parks.—Carite,Guilarte, Maricao, Río Abajo, Toro Negro; Virgini Islands, Sage Mountain, Gorda Peak. Other common name.—breakbill (St. John).

203. Mantequero, *Rapanea coriacea* (Sw.) Mez. Replaces *R. ferruginea* (Ruiz & Pav.) Mez. Botanical synonym.—*Myrsine coriacea* (Sw.) R. Br. ex Roem. & Schult.

204. Bádula, Guiana rapanea, *Rapanea guianensis* Aubl. Medium-sized tree to 50 feet high. Public park.—Sage Mountain. Botanical synonym.—*Myrsine guianensis* (Aubl.) Kuntze.

205. Lechecillo, *Chrysophyllum argenteum* Jacq. Additional public forests and park.—Cambalache, Carite, Maricao; Sage Mountain.

206. Caimito, star-apple, *Chrysophyllum cainito* L. Public forests.—Guajataca, Luquillo.

208. Sanguinaria, wild mespel, willow bustic, *Dipholis salicifolia* (L.) DC. Medium-sized tree to 3 feet in trunk diameter. Additional public forests.—Río Abajo, Susúa, Vega. Botanical synonym.—*Bumelia salicifolia* (L.) Sw.

209. Ausubo, balata, *Manilkara bidentata* (A. DC.) Chev. Large tree to 5 feet or more in trunk diameter. Additional public forest and parks.—San Juan; Virgin Islands, Sage Mountain.

210. Níspero, sapodilla, *Manilkara zapota* (L.) v. Royen.* Public forest.—Estate Thomas. Botanical synonym.—*M. achras* (Mill.) Fosberg.

212. Caimitillo verde, *Micropholis garciniifolia* Pierre. Change in spelling. Additional public forest.—Susúa.

213. Jácana, *Pouteria multiflora* (A. DC.) Eyma. Additional public forest.—Guajataca.

214. Tortugo amarillo, false-mastic, *Sideroxylon foetidissimum* Jacq. A large tree to 100 feet high and 6 feet in trunk diameter. Additional public forests and park.—Guánica, Luquillo, Vega; Virgin Islands.

215. Aceituna blanca, candlewood, *Symplocos martinicensis* Jacq. Public forests and park.—Cambalache, Guajataca, Luquillo, Maricao, Río Abajo; Sage Mountain.

216. Hueso blanco, *Linociera domingensis* (Lam.) Knobl. Additional public forests.—Guajataca, Río Abajo.

217. Alelí, milktree, *Plumeria alba* L. Medium-sized tree to 50 feet high and 1 foot in trunk diameter. Additional islands.—Palominos, Jost Van Dyke. Additional public forest and parks.—Vega; Buck Island Reef, Virgin Islands.

218. Frangipani, *Plumeria rubra* L.* Public forest.—Luquillo.

219. Palo amargo, bitter-ash, *Rauvolfia nitida* Jacq. Additional public forests and park.—Aguirre, Río Abajo, San Juan, Susúa, Vega; Virgin Islands.

220. Palo de vaca, pigeon-berry, *Bourreria succulenta* Jacq. Medium-sized tree to 50 feet feet high and 1 foot in trunk diameter. Additional islands.—Desecheo, Muertos, Palominos, Jost Van Dyke. Additional public forests and parks.—Carite, Guajataca, Maricao, Río Abajo, Vega, Estate Thomas; Buck Island Reef, Virgin Islands.

221. Capá prieto, capa, *Cordia alliodora* (Ruiz & Pav.) Oken. Additional islands.—Jost Van Dyke, Virgin Gorda. Additional public forest and park.—Maricao; Virgin Islands.

222. Muñeco, *Cordia borinquensis* Urban. Other common name.—palo de muñeco (Puerto Rico).

223. Capá colorado, red manjack, *Cordia nitida* Vahl. Public park.—Virgin Islands.

224. Moral, white manjack, *Cordia sulcata* DC. Additional island.—Jost Van Dyke. Public parks.—Virgin Islands, Sage Mountain.

225. Mangle prieto, black-mangrove, *Avicennia germinans* (L.) L. Replaces *A. nitida* Jacq. Additional islands.—Jost Van Dyke, Virgin Gorda. Public parks.—Virgin Islands, Buck Island Reef. Other common name.—salt-pond-tree (Jost Van Dyke).

226. Péndula de sierra, *Citharexylum caudatum* L. Additional public forest.—Toro Negro.

227. Péndula, pasture fiddlewood, Florida fiddlewood, *Citharexylum fruticosum* L. Additional islands.—Muertos, Palominos, Jost Van Dyke, Anegada. Additional public forests and parks.—San Juan, Vega, Estate Thomas; Buck Island Reef, Virgin Islands, Sage Mountain, Gorda Peak. Botanical synonym.—*Citharexylum pentandrum* Vent.

229. Teca, teak, *Tectona grandis* L. f.* Additional public forests.—Susúa, Estate Thomas.

230. Higüerillo, white fiddlewood, *Vitex divaricata* Sw. Additional public forest and parks.—Vega; Virgin Islands, Sage Mountain.

231. Tabacón, *Solanum rugosum* Dunal. Small tree to 30 feet high and 5 inches in trunk diameter.

232. Higüero, calabash-tree, common calabash-tree, *Crescentia cujete* L. Additional islands.—Jost Van Dyke, Virgin Gorda. Public forests and park.—Cambalache, Guánica, Susúa; Virgin Islands.

234. Tulipán africano, African tuliptree, *Spathodea campanulata* Beauv.* Public forest. —Luquillo.

236. Roble blanco, "white-cedar," *Tabebuia heterophylla* (DC.) Britton. Additional islands. —Palominos, Jost Van Dyke. Additional public forests and parks.—San Juan, Estate Thomas; Buck Island Reef, Virgin Islands, Sage Mountain.

238. Roble amarillo, ginger-thomas, *Tecoma stans* (L.) H.B.K. Additional islands.—Jost Van Dyke, Virgin Gorda. Public forest and park.—Estate Thomas; Virgin Islands.

239. Quina, *Antirhea obtusifolia* Urban. Additional public forest.—Guilarte.

240. Café, coffee, *Coffea arabica* L.* There are about 2,200 to 3,000 coffee beans to a pound. Public forests.—Carite, Guajataca, Guilarte, Luquillo, Maricao, Susúa, Toro Negro.

242. Cafeíllo, false-coffee, *Faramea occidentalis* (L.) A. Rich. Public parks.—Virgin Islands, Sage Mountain.

244. Palo de cucubano, "greenheart," rough-leaf velvetseed, *Guettarda scabra* (L.) Vent. Medium-sized tree to 40 feet high and 6 inches in trunk diameter. Public parks.—Virgin Islands, Sage Mountain, Gorda Peak. 730, Cucubano, *Guettarda valenzuelana* A. Rich., replaces *G. laevis* Urban.

245. Cafeíllo, *Ixora ferrea* (Jacq.) Benth. Additional island.—Virgin Gorda. Additional public forests and parks.—Cambalache, Maricao, Susúa; Virgin Islands, Sage Mountain, Gorda Peak. Other common name.—palo de clavo (Puerto Rico).

246. Morinda, painkiller, *Morinda citrifolia* L.* Public forest.—Luquillo.

247. Tintillo, box-briar, *Randia aculeata* L. Additional islands.—Palominos, Jost Van Dyke, Virgin Gorda. Additional public forests and park.—Boquerón, Maricao, Río Abajo, San Juan, Vega, Estate Thomas; Virgin Islands.

248. Juan tomás, *Rondeletia portoricensis* Krug & Urban. Additional public forests.—Carite, Guánica, Susúa.

249. Aquilón, *Terebraria resinosa* (Vahl) Sprague. Medium-sized tree to 60 feet high and 1 foot in trunk diameter.

INDEX OF COMMON AND SCIENTIFIC NAMES IN BOTH VOLUMES

The index follows the plan of "Common Trees of Puerto Rico and the Virgin Islands" (*52*). However, page numbers in that volume, the first, are in ordinary (roman) type. Page numbers in this volume, the second, are in italics.

Common and scientific names adopted in headings for the 750 numbered species and the page numbers where descriptions begin are in heavy (boldface) type, the scientific names in heavy (boldface) italics. Other common names appear in ordinary (roman) type. Common names in the English language are indexed under the last word. Other scientific names, including synonyms, are in italics. Family names, common and scientific, are shown in capitals, the scientific also in italics.

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